Connecting biofuel and deforestation control policies in the Brazilian Amazon The case of Mato Grosso

Freitas, Tiago Miguel D'Ávila Martins De

Awarding institution:
King's College London

“Connecting biofuel and deforestation control policies in the Brazilian Amazon: the case of Mato Grosso”

by

Tiago Miguel d’Ávila Martins de Freitas

Department of Geography

King’s College London

A thesis submitted to

King’s College London for the degree of:

DOCTOR OF PHILOSOPHY (Ph.D)

September, 2015

Abstract

Biofuels are a major element of Brazilian geopolitics and diplomacy. They replace fossil fuels, thereby underpinning national energy security and contribute to Brazilian exports and influence in the world. Biofuels are also one of the GHG mitigation options in the Brazilian climate change regime. However, once land-use related emissions from biofuel crop production are considered, the environmental pay-off is measurably diluted, illustrating one area where two mitigation instruments - biofuel production and deforestation control – can clash. Decisions on how land should be used, whether for food, biofuel production or environmental preservation are therefore crucial, intertwined as they are with land tenure systems and geopolitical discourses and practices.

The thesis investigates the connections between biofuel and deforestation control policies in the Brazilian Amazon with two case studies in the state of Mato Grosso. With a qualitative methodology, the case studies analyse the political ecology of biofuel land-use in the production pathways of biodiesel from soybeans and ethanol from sugar cane.

The study identifies weaknesses in the inclusion of deforestation concerns in biofuel policies and further contradictions on the ground, thus casting doubts about the real GHG emission reduction potential of biofuels. Furthermore, there are also clear efforts at legitimising biofuel crop expansion in the Amazon as a result of discourses and practices operating within Mato Grosso and at the federal level, in contrast to the international commitments on deforestation control made by the Brazilian government. Biofuel and deforestation control policies have been important elements of Brazil's international 'green soft power' strategy, but their domestic contradictions, as the case studies show, are significant.

This thesis examines these pressing issues in a novel way by combining a political ecology approach with critical geopolitics. It also provides the first in-depth analysis of this kind in the Brazilian context - a world biofuel leader - and highlights the need for further scholarship in this pivotal subject.

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Acknowledgements

This research has been primarily funded by the Fundação para a Ciência e Tecnologia, Portugal, whose support was crucial for the successful completion of the thesis. I am also most grateful to King's College for a Partnership grant and supplementary funding from the SSPP and Geography Departments. I would like to thank IEB-USP and CEBRAP in São Paulo for the crucial logistical support I received from them.

I am truly grateful to Professor Raymond Bryant, for believing in my project and in my capacity to improve, for his patience and for his encouragement in my academic endeavours.

Other scholars also provided helpful insights, namely: Jeff Garmani and Richard Schofield in London; Alexandre Barbosa, Alvaro Comin and Ângela Alonso in São Paulo; and the Geography Department and Michele Sato at the UFMT in Cuiabá.

This research would have not been possible without the support of my family. My mother, whose support and example kept me going. Duarte, Mário and Rosemary, for their patience and support. And my nieces and nephews Alexandra, Dânia, Nuno and Filipe whose smiles have always given me the strength to continue.

I must express my gratitude to those who helped with my fieldwork, namely the Portuguese Embassy in Brasília, and the new friends I made in Brazil who made the fieldwork possible: in São Paulo, Antônio and Vanessa; in Rio de Janeiro, Lilian; in Brasília, Janaína and Luciana; in Cuiabá, Valdiney, Rosa Maria, Silvina and Jair; in Sorriso, Selma, Renaldo and family; in Barra do Bugres, Rosane and family, and Rivelino; in Nova Ubiratã, Dilson and family.

I am also thankful to my dearest colleagues and friends Augusto, Giovanna, Amiera, Maria João, Grace, Carolina, Kay, Flávia, Larissa and Roy for their key insights and their patience and friendship in the good and bad times.

Chapter 1. **Introduction**

The use of biofuels is usually depicted as contributing to energy security and greenhouse gas (GHG) emission mitigation[1]. Since the late 2000s however, concerns have arisen regarding the social and ecological impacts of biofuel production, prompting international debate (Wilkinson and Herrera, 2010). A key issue here is the possibility of biofuel expansion resulting in land-use change, i.e. a further driver of deforestation, especially in tropical regions of the South, generally depicted as having agro-energy potential. These land-use consequences represent a GHG contradiction as the emission payoff resulting from biofuel use is inevitably diluted when emissions from land-use change are accounted for. This in turn is an example of conflict between two climate change mitigation instruments - biofuel production and deforestation control. Hence, the controversial decisions on land-use – be it for food, biofuel production or environmental preservation - are decisive given the fact that the land available has its limits, even in natural resource rich countries such as Brazil. Furthermore, land-use choices are entwined with historically rooted and highly contextual land tenure systems, as well as with geopolitical discourses and practices by state and non-state actors.

The primary aim of this thesis is to analyse the connections between biofuel and deforestation control policies in two Brazilian case studies. As these policies interrelate in complex ways, underpinning conflicting land-use choices, this thesis will undertake a political ecology approach to ascertain the ways they connect at various scales, including a concern with geopolitical practices and discourses related to land-use. By doing so, this thesis will contribute to knowledge on the politics of land-use impacts of biofuel production in Brazil.

This chapter aims to present the main topics of the research and its specific contents. It will start by introducing the Brazilian biofuel drive and how it can collide with deforestation control objectives (section 1.1), as well as how these relations underpin territorial choices and conflicting priorities of land-use set in a Brazilian-specific natural resource geopolitical context (section 0). It will then outline the research questions of this thesis (section 1.3). Finally, the structure of the thesis is described in section 1.4.

[1] In the international climate change regime, mitigation refers to measures with the objective of reducing the emission of GHG, so as to avoid 'dangerous' climate change.

1.1 Biofuels and deforestation control: grasping the possible contradictions

Climate change is a pressing international issue; so is the drive to produce biofuels in a large-scale effort, aimed at reducing dependence on fossil fuels and the related climate change-inducing emissions. However, this environmental payoff is somewhat diluted as biofuels are blamed for increasing deforestation and emissions from land-use, as well as for replacing areas for food production, which has put a strain on the initial biofuel euphoria, especially since the global food price crisis in 2007-08 (Dauvergne and Neville, 2010; Wilkinson and Herrera, 2010).

The global expansion of biofuels and their socio-environmental impacts have been a popular research topic (to cite just a few, see the special edition of the Journal of Peasant Studies in 2010[2]; Assis and Zucarelli, 2007; Abramovay, 2008; Holt-Giménez and Shattuck, 2009; Hodbod and Tomei, 2013; Neville, 2015). Framed within the context of the elaboration of agrarian capitalism, global land grabs and consequent displacement of traditional populations, biofuel expansion has been blamed for contributing to both the global food crisis and to deepening climate change (e.g. Rosset, 2009; Holt-Giménez and Shattuck, 2009; McMichael, 2010). For Philip McMichael (2010), for instance, biofuel development is an attempt to internalise externalities through artificial offsetting of GHG emissions, while at the same time actually releasing more carbon from recently cleared land, and deepening food insecurity.

However, when impacts of biofuel at the local level are considered, much of the literature remains 'high level' and indeed quite hypothetical (Hodbod and Tomei, 2013). As Borras et al. (2010) highlighted, the consequences of biofuel production are based on intricate interactions among state, society and capital, which are generally specific to a particular context. Bearing this in mind, this thesis tries to cast more light on the issue of location specificity by investigating two case studies from Brazil.

Brazil's relevance for the biofuel/land-use dilemma is notable for a number of reasons. Not only is the country a major biofuel producer (especially of bio-ethanol for which the country was the second biggest producer and exporter, behind the USA, in 2014)[3], but it also neatly showcases the

[2] The Journal of Peasant Studies, Vol 37, No 4, October 2010.
[3] USDA website: http://www.fas.usda.gov/data/us-ethanol-exports-rebound-2014, accessed 26 August 2015.

controversies pertaining to biofuel practices and respective GHG emissions as biofuel crops further penetrate into the Amazon with direct and indirect land-use GHG emissions. Holding this major agriculture frontier in the 21st century, Brazil is involved in the occupation of 'empty' land (though naturally rich in carbon and biodiverse) with the consequent territorial disputes between traditional community practices and those practices of natural resource exploitation, such as commodity monoculture expansion (Hecht and Cockburn, 1989; Almeida, 2010; Porto-Gonçalves, 2012b).

Ethanol (a biofuel derived from plant sugar or cellulose) and biodiesel (biofuel produced from plant oils or animal fat) are mostly produced in Brazil with sugar cane used for the former and soybean used for the latter. While the large scale development of ethanol was originally in response to the oil crisis in the 1970s (the Proálcool – National fuel alcohol programme), rather than being a measure for mitigating climate change, biodiesel development (the PNPB – the National Programme for the Production and Use of Biodiesel) is much more recent (2005) and has had from its origin explicit social and environmental objectives.

Large-scale production of sugar cane and soybean allows the country to produce large quantities of biofuels and pursue an expansion programme to increase biofuel consumption internally, as well as to boost biofuel exports. However, the demand for biofuels in the international market (hence the benefit that Brazil might expect to gain) depends upon demand-side factors such as oil prices, the establishment of biofuel incorporation targets in its main importers, or global tendencies in technological choices (e.g. electric car versus biofuel).

Nationally, the question of producing enough to fulfil both national consumption (the world's largest commercial application of biomass used for transport) and exports is gaining more relevance. This is a result of growing energy demands and the adoption of a 'modern' lifestyle by an increasingly affluent Brazilian society, as a result of the well-known and largely successful inequality reduction measures of the Lula da Silva years. This growing energy consumption, without efficiency gains (Abramovay, 2010) or a change in the basic mix in the transport sector, casts doubt on the country's capacity to fulfil its own needs in biofuels, let alone global demand. Furthermore, the discovery of new oil reserves (referred to as the pre-salt reserves), apparently securing Brazil's prospects as a future oil exporter, further increases uncertainty about the relevance of biofuels in the future. The recent

economic and political crisis (with a recession expected in 2015), in turn, has brought new developments to the already complex issue.

At the same time, Brazil is busy drafting and implementing climate change mitigation policies - with specific programmes for the reduction of deforestation in the Amazon and Cerrado biomes, all showcased in the National Climate Change Plan where biofuels too have a part. The country however does not formally have binding commitments under the United Nations Framework Convention on Climate Change (UNFCCC), due to Brazil's classification as a 'developing country' under the 'common but differentiated responsibilities' principle.

Indeed, the voluntary adoption of GHG reduction commitments has here a more image-promotion connotation; that is, it needs to be understood in the framework of the Brazilian international quest for greater prominence. Notwithstanding the current economic and political crisis, Brazil is an emerging economy with significant power (being part of the BRIC group with Russia, India and China)[4]. Moreover, the country is considered to be in a good position in international climate negotiations compared to other emerging economies, due to its relatively 'clean' energy matrix (if large hydro-electric dams are to be considered 'clean') and recent accomplishments in reducing deforestation (Giddens 2011). In fact, deforestation was indeed until very recently the major cause of Brazilian GHG emissions, making Brazil one of the top emitter countries in the world (ranking 6th in 2012)[5].

As it holds a large portion of the Amazon, Brazil is the frontline country in the struggle against deforestation and consequent GHG emissions – indeed to what extent this problem is controlled in the Amazon will have a major effect on how far the worst impacts of climate change can be avoided (Giddens, 2011).

Hence, political ambitions to be a key country in global affairs (already seen via prominent involvement in the G20) means that here, too, Brazilian policy needs to demonstrate global leadership, by fostering positive outcomes in the UNFCCC negotiations and by adopting voluntary commitments. Here biofuels play an important role in Brazilian climate change policy as 'mitigating agents', together with voluntary targets for the reduction of national deforestation rates.

[4] The acronym BRIC was coined by the investment bank Goldman Sachs in 2001, to refer to the countries that could become among the four most dominant economies by the year 2050: Brazil, Russia, India and China.
[5] World Resources Institute, emissions data from 2012, in http://cait.wri.org/, accessed 4 September 2015.

However, the combined effects of the twofold strategy of increasing biofuel production and reducing deforestation have contradictory implications. In fact, the direct land-use changes associated with biofuel production (deforestation to produce energy crops) and the indirect land-use changes (energy crop production in a non-forested area provokes the displacement of other crops to forested areas, see Chapter 6), especially in the Amazon, can increase deforestation and offset carbon savings from biofuels (Fargione et al., 2008; Gibbs et al., 2008; Finco and Doppler, 2010; Lapola et al., 2010). This is the main example of how conflictive biofuel and deforestation control policies can be, especially given the importance of Amazon deforestation to the Brazilian international image and in the climate negotiations.

Finding the right coordination between those two policies is a significant challenge, but also presents an opportunity for Brazil to enhance its stature. The Brazilian authorities have, at least discursively, tried to follow the premises for a more 'sustainable' biofuel production in terms of land-use - hence, agro-ecologic zoning systems; improvement of agricultural management and yields; stimulation of the use of degraded lands; or working on sustainability certification schemes. But the inclusion of environmental considerations in biofuel policies so as to tackle their land-use effects must be perceived in the context of a generally poor implementation of environmental policy and competing priorities - the 'environment versus development' trade-off being a paradigmatic example - in the Executive.

Conflicting uses of land brought about by this challenge – whether to allocate for food, fuel or forest preservation - may appear exaggerated in a natural resource rich country like Brazil. However, as other factors interacting in this equation are considered, the geopolitical picture of 'bountiful' land resources is far from evident. In fact, Brazil is an exemplary case of the food-energy-climate change trilemma (Harvey, 2014) and has a long history of convoluted legal and policy articulation on a variety of issues, which only reinforces the need for an in-depth study of the kind proposed here (Hall, 1989; Hecht and Cockburn, 1989; Toohey, 2005; McAllister, 2008).

1.2 The (geo)politics of land in a natural resource-rich country

> Giant by thine own nature,
>
> thou art beautiful, thou art strong, an intrepid colossus,
>
> and thy future mirrors thy greatness.'
>
> (...)
>
> 'Eternally laid on a splendid cradle,
>
> by the sound of the sea and the light of the deep sky,
>
> thou shiniest, O Brazil, garland of America,
>
> illuminated by the sun of the New World!
>
> (Excerpt from the Brazilian national anthem).

.....

Brazilian actor Lima Duarte, in a poetic call for pride in Brazilian agriculture, says:

> *– Bendita terra que me dá orgulho de dizer: Sou agro! Sou agro-brasileiro!* [This blessed land makes me proud to say: I am Agro! I am Agro-Brazilian][6].

Telenovela[7] actress Giovanna Antonelli, in a modern apartment surrounded by shining skyscrapers in an unidentified Brazilian city, highlights the Brazilian agricultural potential and the agricultural richness and diversity that allow her to fill up her modern fridge with diverse products, and her car with biofuel. The Internet spot is complemented with background pictures of busy avenues and modern buildings, intermixed with images of vast monoculture fields and modern agricultural machines, finishing with Ms Antonelli saying:

> - '*Sou Agro*' (I am Agro)[8].

(Description of two '*Sou Agro*' advertising Internet spots, 2011 - a campaign to promote Brazilian agriculture internally[9], sponsored by major agribusiness companies[10]).

.....

[6] In: https://www.youtube.com/watch?v=_J-ONMAmQos.
[7] *Telenovela* is a dramatic serial programme popular in Latin American TV channels, running for a limited time.
[8] In: https://www.youtube.com/watch?v=07iJt0kpUsU.
[9] In: http://souagro.com.br.
[10] These include, for instance, UNICA, Bunge, Cargill, Vale and Monsanto.

These apparently non-related social extracts may seem disconnected. However, in different ways, they highlight the importance of natural resources in forging a nation - the ‘splendid cradle’ in the national anthem reveals a more than a century old natural resource driven geopolitical culture, designed to enhance the country's international stature; or in the modern pursuit of modernisation and progress visible in the case of the two advertising spots.

By depicting a natural resource-rich country that is able to fuel its population’s growing consumption patterns and modern lifestyle with a modernised, large-scale agriculture, the two advertising spots equal the image of how the Brazilian government wants to be seen in the world: a great agricultural commodity exporter and also a great agricultural know-how exporter, thus helping the world to overcome its growing food crisis. But they somehow completely neglect the ‘rurality’ that coexists with the more successful and modern aspects of the country clearly depicted by the modern city images. In fact, as the agribusiness expansion unfolds, traditional communities are displaced, agrarian struggles and land concentration deepen, and the environment is further degraded. This complete disconnection between the modern lifestyle and the socio-environmental impacts of its means of subsistence further strengthens the naïve belief in the possibilities of progress given the country’s natural resource richness. It does not acknowledge the centuries old and still present unsustainable management of natural resources, that takes for granted the ‘splendid cradle’ and the unlimited possibilities of the country’s natural endowments, leading to historically unsustainable exploitation (De Castro, 1946; Hall, 1989; Hecht and Cockburn, 1989) and a possible ‘resource curse’ (Ross, 1999; De Soysa, 2000; Robinson et al., 2006; Brunnschweiler and Bulte, 2008).

Current Brazilian geopolitics and diplomacy aimed at strengthening its place in international relations reflect this centuries-old belief in natural endowments. Natural resources have been a major factor shaping national identity and have historically influenced how the country perceives itself and how it behaves with other countries (Carvalho; 1998; Becker, 2005; Hochstetler and Keck, 2007). However, it is not clear to what extent Brazilian geopolitical practices and discourses, as well as stances on the international stage reflect any concerns with the structural environmental and social impacts of the exploitation of its natural resources. What is clear, however, is a fierce nationalist stance against foreign influence in the use of the country’s natural resources (Arnauld de Sartre and Taravella, 2009; Zhouri, 2010).

This stance can be traced back to the origins of Brazil in 1500. Ever since then, the geopolitics of protecting Brazilian territory and controlling natural resources has played a crucial role in the history of the country (Bethell, 1987; Barman, 1988; Skidmore, 2010). Thus, the Treaty of Tordesillas (1494) dividing the world in two halves (one for the Portuguese Crown, the other for the Spanish Crown)[11] is considered to have deep-rooted repercussions in contemporary Brazil. In fact, it symbolises the tensions regarding frontier limits and is notably at the root of the formation of the Brazilian nation and it was the main responsible for current Brazil's vast territory (Becker, 2001; Moraes, 2011).

During the colonisation of Brazil, territorial practices of occupation and administration revealed a preoccupation with the protection of the territory against 'foreign' hands (notably Dutch and French). Additionally, there was an initial concern with knowing the territory and its resources[12]. Foreign geographers and naturalists attracted to Brazil's natural richness (Humdbolt, Spix, Von Martius, Darwin, to cite just a few) contributed to the idea of an exuberant, naturally-endowed country. But foreign curiosity raised nationalistic concerns (Hecht and Cockburn, 1989). A zealous approach towards the protection of its endowments against foreigners remains apparent today and was especially evident during the military dictatorship (1964-1985).

The anti-foreign stance underpinning the country's 'integration' and 'development' objectives led to some of the most environmentally and socially-damaging processes in the history of the country. Mega-development projects such as the Transamazônica highway, the colonisation of Rondônia or the *Grande Carajás* Project reveal geopolitical practices embedded in violence and large-scale environmentally destructive consequences (Hall, 1989; Hecht and Cockburn, 1989). The nationalistic stance towards the environment, so evident in the military dictatorship, still shapes Brazilian environmentalism and environment policies by framing it in terms of foreign influence threatening national control (Arnauld de Sartre and Taravella, 2009; Zhouri, 2010). Furthermore, in the UNFCCC negotiations, Brazilian stances have until very recently demonstrated an inflexible position towards any kind of regulation of forests based on a fear of foreign intrusion (Johnson, 2001; Viola, 2002; Viola, 2004).

[11] The Treaty of Tordesillas still entertains controversy about the real knowledge of the existence of Brazil by the Portuguese Kingdom prior to its 'official' 'discovery' in 1500, as the dividing line was traced so as to include a part of the current Brazilian territory in the Portuguese side of the world (Bethell, 1987; Skidmore, 2010).
[12] Such as the 1783-1792 expedition by Alexandre Rodrigues Ferreira, fostered by the Marquis of Pombal.

The Amazon is here the paradigmatic example. It has been the focus of national and international attention for centuries: from an imaginary nature to a 'green hell'; from a resource reservoir to an endless land available for agriculture expansion; from a national sovereignty issue to one important in defining Brazilian identity; from a demographic empty space to be colonised to an ecological reserve for the planet (Hecht and Cockburn, 1989; Melo, 2006; Porto-Gonçalves, 2012a). Competing visions have unfolded as different occupation and exploitation cycles occurred, generating ecological degradation and conflicts among different peoples with different livelihoods and representations of their surroundings. The current 'conservation versus development' dichotomy is a case in point with the two remaining in excluding spheres (Melo, 2006). An intermediary stance could be seen in 'socio-environmentalism', which is both a social movement and a policy creation, related to the environmental realities developing in some of the Amazon[13].

Ambiguities in environmental policy dynamics and on-going high deforestation rates mean that the country is still 'integrating' new territories for agriculture, notably monoculture commodities, in the 21st century. The food-energy-climate change trilemma in Brazil's vast territory means that notwithstanding the abundance of land, conflicts and contradictions arise.

In fact, competition for land is exacerbated by the land struggles that occur on the agriculture frontier, where biofuel expansion is most evident - an area with a complex mix of indigenous communities, poor settlers, poachers, forest dwellers and agribusiness that interact, often violently. This is related to the role of historically powerful rural oligarchies who still impose unequal land access leading to rural poverty (Freyre, 1933; Lehtonen, 2009; Skidmore, 2010; Wolford, 2010).

The inclusion of the question of food appears to be a paradox in resource-rich countries such as Brazil, but empirical evidence already points towards a conflictive relation between biofuels and food production. Finco and Doppler (2010), for instance, have shown the negative impacts of biodiesel production on food production in the Brazilian Cerrado, while Novo et al. (2010) have shown the adverse impacts of bio-ethanol production on dairy and beef production in the state of São Paulo. Indeed, the famous Brazilian geographer Josué de Castro had already in 1946 demonstrated how nutrition deficiencies (and overall inequality) reflected a lack of planning in the use of natural resources. This would be the consequence of a bias towards private interests against 'incapable'

[13] In this respect, see the concept of 'productive conservation' (Hall, 1997) or 'socio-natures' (Hecht, 2011).

public institutions, as short term and easy profit from abundant resources underpinned a predatory colonisation with successive economic cycles of destructive exploitation (De Castro 1952).

Conflicting land-uses notably underpinned by biofuel production in the agriculture frontier mean that the Brazilian state must prioritise its territorial practices as the myth of unlimited land and resources is put into question by growing climate change concerns, allied food security issues and the seemingly inevitable food versus fuel conflict (Holt-Giménez and Shattuck, 2009; Tilman et al., 2009; Finco and Doppler, 2010; McMichael, 2010; Harvey and Pilgrim, 2011).

This complex material and discursive struggle over the use of land is in turn enriched with contested scientific claims about land cover, deforestation rates, and the appropriate technologies to monitor land-use change, as well as competing scientific discourses on the benefits and negative impacts of biofuels. The land-use question surrounding biofuel production and climate change is thus very complex, casting doubts about the possibility of having enough land for the production of biofuel to sustain growing Brazilian consumption and export objectives while sparing the Amazon at the same time. It is also still unclear how the geopolitical practices and discourses by Brazilian state and non-state actors are confronting these challenges. This complex connection between biofuel and deforestation control policies is the primary issue underpinning this thesis and its particular research questions are explained next.

1.3 Research objectives

The main objective of this PhD is to understand how the Brazilian biofuel strategy is intertwined with and influenced by deforestation control policies in the context of this country's natural resource geopolitics. Biofuel promotion and deforestation control are key facets of Brazil's diplomacy notwithstanding domestic disputes regarding them let alone their possible contradictions (notably regarding land-use).

This thesis investigates these issues via four main research questions (RQ). Thus, RQ 1 assesses to what extent and in what ways Brazil's twin drive to promote biofuel production and deforestation control objectives relate to a wider natural resource driven geopolitics designed to enhance the country's international stature. Furthermore, it aims to gauge how these professed international objectives are, in turn, connected to domestic political dynamics.

Given the possible land-use contradictions of biofuels, RQ 2 explores how the biofuel effort is articulated in relation to the country's national and international objectives regarding deforestation control. That is, how and why biofuel policies include deforestation considerations, for instance whether the latter leads to a 'green' re-articulation of biofuel narratives. It also seeks to identify those claims justifying the inclusion or absence of deforestation concerns in biofuel policies.

At the same time, this thesis seeks to connect political dynamics surrounding biofuel/deforestation control to actual land-use. To assess how these policy initiatives fare on the ground, two case studies are implemented (one for biodiesel and one for ethanol) that enable us to grasp the local complexities surrounding this dynamic.

Hence, RQ 3 investigates the political ecology of biofuel land-use, namely how the particular biofuel socio-political dynamics in each case study shape land-use. Factors shaping farmers' decisions, farmers' land-use trajectories, and how local actors perceive land-use change are fundamental issues that need to be included in a well-rounded analysis to better understand possible land-use contradictions. This RQ helps to clarify how policy articulation and discourses investigated in RQ 2 translate on the ground.

Indeed, it is at the level of individual property holdings that biofuel land-use contradictions can be fully grasped. Hence, and following on from RQ 3, this thesis considers how deforestation control policy – ultimately the only real instrument to restrict deforestation in Mato Grosso – affects the holdings. RQ 4 thus examines the political ecology of deforestation control policies, namely how the latter play out locally and are contested by biofuel crop producers. As in RQ 3, understanding location-specific socio-political dynamics shaping policy implementation is key, including the way policies, politics and discourses entwine on the ground.

1.4 Structure of the thesis

In keeping with these research aims, the thesis is structured as follows. Chapter 2 presents selected literatures and concepts upon which the thesis is based theoretically. Political ecology provides a framework for a multi-scale analysis of environmental problems in their political and economic contexts, mindful of unequal power relations and the role of discourses and knowledge. This thesis draws too on work in critical geopolitics to examine the material and discursive ways in which the

Brazilian state as well as non-state actors interact over issues related to biofuel production and deforestation control. Such dynamics reflect natural resource geopolitics, specifically questions about land access and tenure. The biofuel land-use issue is also linked to research done in the framework of global energy and environmental security risks. Finally, Chapter 2 explores selected international relations theories on the politics of climate change, with a particular emphasis on historical North/South equity questions in order to inform our understanding of Brazil's position on this matter.

Chapter 3 presents the methodology, particularly the techniques utilised in data collection. Starting with an explanation of the ontological and epistemological assumptions guiding the study, notably the choice of qualitative research and a case study approach, it then justifies the choice of Mato Grosso as the setting for the case studies. The research techniques - documentary analysis, semi-structured interviews and direct observation – are then explained, as well as the associated ethical implications. Finally, this chapter discusses practical issues relating to the field research that were encountered.

The thesis then turns to empirical matters. Thus, Chapter 4 sets the scene by providing an overview of Brazil's and Mato Grosso political economy. It outlines Brazilian biofuel and deforestation policies while introducing the relevant actors. It also describes the local socio-economic context of both case studies.

Chapter 5, which is the first of the four main empirical chapters that broadly correspond to the four RQs, examines how Brazil's drive to promote biofuels as well as deforestation control objectives relate to a wider natural resource driven geopolitics designed to enhance the country's international stature, thus answering RQ 1. It first contextualises the use of these policies in Brazil's 'development diplomacy'. It then examines the evolution of the country's internationally-pledged Amazon deforestation control objectives and their constitution into a 'green soft power' tool. The chapter then explores those domestic political dynamics and competing perceptions that complicate Amazon protection. Finally, Chapter 5 explores the logic as well as domestic struggles surrounding biofuel programmes to clarify how these fit into Brazil's geopolitical concerns.

Chapter 6 then looks specifically at deforestation concerns in biofuel policies and competing claims about the deforestation impacts of biofuels, thus answering RQ 2. It considers the inclusion of environmental provisions in the biodiesel programme (PNPB) as well as in the ethanol sector. Finally, the chapter examines the five main discourses regarding the land-use impacts of biofuels that are

used by both state and non-state actors to legitimate the absence of stricter environmental provisions, as this too helps to address RQ 2's core concern about the articulation of biofuel policies with deforestation control objectives.

The PhD then turns to location-specific practices, starting in Chapter 7 which explores those local social and political relations in the biofuel sector that shape land-use, thus answering RQ 3. It thus examines the socio-economic dynamics of biodiesel production from soybeans in Case Study 1. In doing so, it gauges the possible social contradictions of the PNPB and its land-use consequences. The chapter then turns to ethanol production from sugar cane in Case Study 2 where a different institutional context, land tenure structure, and land-use practices reveal distinctive biofuel-induced deforestation drivers.

Chapter 8, in turn, focuses on the impacts of deforestation control policies on biofuel crop holdings, thus addressing RQ 4. It outlines the Mato Grosso deforestation control system before providing an analysis of each case study, with an eye to the specific institutional arrangements framing deforestation control. Here, is explored not only how biofuel crop farmers are affected by deforestation control policies but also how they perceive these policies and seek to contest them. Lastly, the chapter addresses how farmers' perceptions relate to wider agribusiness discourses regarding deforestation control and environmental issues in Mato Grosso, thereby providing a further element of the local socio-political dynamics and hence contributing to the investigation of RQ 4.

Finally, Chapter 9 summarises the main findings of the thesis: how two sorts of policies aiming at mitigating climate change – biofuel and deforestation control - connect as they are implemented across different scales, and with which ensuing contradictions and complications; how this dynamic in turn relates to Brazilian geopolitics and international objectives. The chapter discusses the limitations of the study before assessing the broader implications of the thesis and possibilities for future research.

Chapter 2. **Theoretical framework**

This thesis aims to understand the connections between biofuel and deforestation control policies in Brazil as well as how these in turn affect and are affected by a broadly-defined natural resource geopolitics. The environmental issue here – GHG emissions from biofuel-related land-use change – is a complex one, as biofuels are also considered part of the tool kit for mitigating climate change. When this is framed against a background of conflicting territorial land-uses, a context-specific analysis of socio-environmental dynamics must be undertaken, even as wider connections point to the need for multi-scalar analysis.

The PhD draws theoretically on diverse literatures and concepts, starting with political ecology (section 2.1), so as to provide a multi-scalar analysis of environmental problems in their specific, political and economic contexts. Complementing this approach, the thesis aims to understand how local practices are influenced by economic factors, hence a concern with political economy (section 2.2). Furthermore, it is also interested in environmental narratives and political discourses, which reveal unequal power relations and the significant role of science (section 2.3).

To grasp the material and discursive ways in which state and non-state actors interact over issues related to biofuel land-use, this thesis also draws on work in the field of critical geopolitics (section 2.4). Such dynamics reflect natural resource geopolitics, namely questions about land access and tenure - thereby 'complicating' the geopolitics of a natural resource-rich country like Brazil (section 2.5). The biofuel land-use issue is also linked to research done about global energy and environmental security risks (section 2.6), which underpin an extra pressure on the nation-state's territorial practices and geopolitical rationales. Finally, section 2.7 explores selected international relations theories on the politics of climate change, with a particular emphasis on North/South equity questions.

2.1 The political ecology approach

Geography has had a long-standing interest in the relationships of human society with the natural environment. Political ecology, being the most recent expression of this academic interest, is an empirical scholarly field (borrowing from a range of academic disciplines especially human geography, anthropology and ecological sciences) that explores the "linkages in the condition and change of social/environmental systems, with explicit consideration of relations of power" (Robbins, 2004: 12).

This critical approach frames environmental problems as complex sets of ecological and social processes that interact in a dialectical way. Political ecology thus recognises that these problems are at the same time political and ecological, as well as social and biophysical. For this thesis, it helps to frame both the material and discursive aspects of biofuel land-use politics.

A foundational work in political ecology was Blaikie and Brookfield's (1987) *Land Degradation and Society* which explained how social marginalisation was both the origin and consequence of land degradation. The authors demonstrated that decision-making of farmers could not be understood without considering the wider socio-economic dynamics functioning at multiple scales – for instance state institutions and the global markets - leading to the extraction of surplus from the environment and hence to degradation. Thus in political ecology the causes of environmental degradation are traced through 'chains of explanation' with increasing scales of interaction, with a special interest in the role of power and discourse in determining socio-environmental contexts.

Building on this approach, Robbins (2004) proposes networks as a less hierarchical way of managing these linkages and relationships so as to better understand socio-natural situations. Networks, the author states (2004: 211), "organise and are organised by a range of human and non-human actors, through systems of accumulation, extraction, investment, growth, reproduction, exchange, cooperation and coercion".

This is of great relevance in the case of biofuel crop land-use, as policy and market signals operating at the macro level impact on actual land-use happening on the ground. This is a highly contextual process resulting from the interplay of different state and non-state actors, in addition to institutions, across governance scales. Either conceptualising human-environment relations via a 'chain of

explanation', or a network approach, this underpins the inevitable complexity of working with a multitude of scales, as well as the problem of accommodating different scalar arrangements at the same time for the biophysical and social elements of analysis.

There is a major debate in human geography about the ontology and epistemology of scale research (Smith, 1992; Swyngedouw, 1997; Zimmerer and Basset, 2003; Neumann, 2009). Zimmerer and Basset (2003), for instance, highlighted the importance of avoiding pre-given scalar containers to study socio-environmental dynamics. In fact, given the social construction and historical contingency of scales (Neumann, 2009), it is undesirable to establish *a priori* scale preferences in political ecology, thereby avoiding the 'local trap' (Agnew, 1994), as "there's nothing inherent about scale" (Brown and Purcell, 2005: 607). Choices of scalar arrangements in environmental governance, for instance, may not be neutral and indeed reveal politicised struggles on the environment.

In fact, power asymmetries play a critical role in defining networked relations within and between scales (Little 2006; Neumann, 2009), hence a strong interest in political ecology is given to the politics of scale, notably in the struggles over the control of resources and the environment more generally (Boyle, 2002; Sneddon, 2003; Molle, 2007; Swyngedouw, 2007). Resources and environmental issues can be framed, catalysed and regulated according to particular scalar dimensions so as to legitimise given perspectives or power relations. Brown and Purcell (2005), for instance, using the example of the Amazonian development struggles in Brazil (where the anti-mega development campaign achieved a scalar reorganisation away from a national arrangement and toward a 'glocalised' one), suggest both scales and scalar relationships are the object and the outcome of political struggle. Scale should thus be considered a relational idea, meaning that political ecology should look at the relations between different scales when analysing a particular socio-environmental issue.

Being mindful of the politics of scale surrounding the biofuel land-use issue is relevant because claims about environmental change are inherently scale-specific. Scalar choices for the analysis of this issue are shaped by politics, intertwined as it is with science (see Budds, 2009, for the interplay between science and politics in scalar arrangements of water governance in Chile). Certainly, the choice of the scale of analysis, the categories and definitions (of land, GHG emissions, forest and deforestation),

and the chosen models and methodologies to scientifically tackle the land-use issue, are not politically innocent (see Chapter 6).

Now that the political ecology framework was presented, and its concern with scalar relations outlined, this chapter turns to two specific concerns in political ecology research: the material and the discursive aspects of socio-environmental issues. These are investigated by employing, respectively, political economy critique; and poststructural approaches to discourses, knowledge and power, which are depicted in the following two sections.

2.2 Political economy critique

Such political ecology analyses make it necessary to understand how local practices leading to environmental degradation relate to the overall economic system. Here, Marxian materialism helps to clarify how capitalist production requires the extraction of surpluses from both labour and nature. Contradictions thus emerge, placing barriers to additional growth as extraction rises in intensity (Bryant, 2001; Robbins, 2004). In this regard, O'Connor (1998) refers to an 'ecological marxist' contradiction by counter posing capitalist production relations with the conditions enabling it (which include environmental settings and natural resources).

The socio-economic conditions found on the ground may be, however, very complex, as different levels of exposure to capitalism may coexist in the same region. From indigenous subsistence hunting and gathering to export agriculture (Bunker, 1985), for instance - an example of the typical progression from subsistence to accumulation in the evolution towards 'modernity', increasing the 'metabolic rift'[14]. One needs, therefore, to pay careful attention to specific labour structures, for instance if farmers own land or are mere wage labourers (the issue of access to resources in political ecology is dealt with later). Furthermore, normative and discursive factors (see also 2.3 below) may also add a certain degree of complexity, for instance, when different values are given to a particular natural resource (such as cropland, forests or water). Moreover, the very definition of a resource such as land may vary, as well as the interpretations of what constitutes environmental degradation (Steward, 2007; Walker, 2011).

[14] The separation of labour from its means of subsistence, whereby productive relations and social institutions are increasingly embedded in the market, subordinated to value relations (McMichael, 2010).

In the particular case of agriculture and land resources, the current neoliberal 'food regime'[15] has shifted the institutional setting from a state-centric to a global landscape, through a combination of privatisation and liberalisation to accommodate transnational capital (McMichael, 2010). The impact of state relations with transnational corporations (TNCs) and other states, and the role of 'comparative advantages' in production (opportunities states seize in the international arena which are, in turn, mediated by state institutions and state-society relations) influence, in their turn, the (differential) production and impacts of biofuels in different Southern economies (Dauvergne and Neville, 2010).

However, today's agrarian questions are not simply about the political tendencies of capitalist development; rather they concern the politics of constructing the means of 'accumulation by dispossession' (Harvey, 2005). In this perspective, biofuels can be seen as logical extension of an agro-industrial future, in which small farmers are progressively incorporated into food-fuel value chains premised on global 'agriculture without farmers' (La Via Campesina, cited in McMichael, 2010: 612), thus deepening the 'metabolic rift'.

There is a second reason for including political economy critique in the analysis of biofuel land-use politics in Brazil. In fact, apart from the above-mentioned critiques to neoliberalism's influences on local extraction and production practices (see too Peet and Watts, 1996; 2004), political ecologists also criticise the influence of neoliberalism on environmentalism itself[16] and claims about the 'greening' of capital (e.g. Escobar 1996; Büscher et al., 2014), which both affect environmental policy worldwide.

Here, approaches grounded in political economy provide critical accounts of the expansion and the diversity of neoliberal environmentalism. This relatively recent, and increasingly common, approach to environmental conservation (and notably shaped and shaping the environmental discourses depicted in section 2.3) is an important facet of deforestation control strategies (in Brazil especially under Axis 3 of the PPCDAm, see Chapter 4). These depart from the 'typical' command-and-control to more 'conciliatory' approaches, notably shaped by the sustainable development discourse and market mechanisms. These coexist and sometimes clash in Brazilian environmental politics.

[15] Food regimes explain food production and consumption relations across historical periods (Friedmann and McMichael, 1989). They provide a useful frame to discuss the political and economical role of agriculture and food, and hence the 'agrarian question' (McMichael, 2010).

[16] Castree identifies processes such as privatisation, marketisation, deregulation, reregulation, commercialisation, and corporatisation, which can all be labelled under neoliberal environmentalism, their locally-rooted practices being, however, diverse (Castree, 2010a; 2010b; 2011; see too Büscher et al., 2014).

More broadly, neoliberal environmentalism[17] might have contributed to international awareness of environmental problems, provided new potential sources of leverage for the South, and softened North/South confrontations over the environment (Bernstein, 2000). It has also contributed to make 'the environment' an important factor in international competition (Görg and Brand, 2000). However, it does not really intervene in the root of environmental problems and hence does not offer a realistic prospect of a righteous combination of economic growth and environmental protection (Bakker, 2007).

One of its facets is the 'commodification of nature' (where environmental goods are considered to "be more efficiently allocated if treated as economic goods", Bakker, 2007: 432) and efforts to create and impose new private property regimes that remake ecosystems, livelihoods and identities (Büscher et al., 2014). In addition to its disciplinary and regulatory role, neoliberal environmentalism, through the 'commodification of nature', could also be seen as "an emergent regime of accumulation that redefines and co-constitutes socio-natures" (Bakker, 2010: 726). The carbon market and associated 'green grabs' are examples of these tendencies. So is biofuel development, as its carbon mitigation potential is implemented in the global South for the sake of Northern consumption (Dauvergne and Neville, 2010; McMichael, 2010).

Neoliberal environmentalism and its public-private hybrid structure do not question the roots of environmental degradation, thus sustaining the historical North/South fault lines regarding environmental justice. In fact, the globalising capitalist system in colonial and postcolonial times was and still is a major cause of the environmental crisis in the South, with 'First World' TNCs having been the principal driving force behind those processes - the relationship between business and the Southern politicised environment is crucial for the comprehension of the environmental question there (Bryant and Bailey, 1997). This critique underpins a concern with capitalist consumption in the North driving unsustainable production and destruction in the South. The politics of global environmental problems must therefore be comprehended as internal to the logics of capitalism, but also part-and-parcel of other power structures of world politics such as the state system, knowledge structures and patriarchy (Paterson, 2001).

[17] Also called 'liberal environmentalism (Bernstein, 2000), 'green neoliberalism' (Goldman, 2006), or 'market environmentalism' (Bakker, 2007), it is a way of managing resources that deploys markets as the solution to environmental problems (Anderson and Leal, 2001).

Finally, and following on from this North/South divide, political economy literature can inform the analysis of biofuel land-use politics by providing broader models and representations of the world economic system and its fault lines. These include competing notions of how to foster economic development, the expansion of 'modernity', and 'development' in the South, as well as the counter-strategies enacted in the South.

Capitalist expansion in the South thus goes hand in hand with the spread of 'development' and 'modernity' from the North (see 2.3 and 2.5 below), which imposes unsustainable extractive regimes of accumulation that result in environmental problems and production for the global market leading to contradictions and dependencies (Escobar, 1995). 'Development' means the prospect of prosperity without limits or regrets for some, and a confidence that the North knows how to achieve it (Sheppard et al., 2009).

Political economy approaches to development and underdevelopment have flourished in the second half of the 20th century, notably by Dependency School theorists[18]. These argued that long dominant capitalist powers (the USA and the UK) stimulated the change of political and economic structures in order to attend their own interests. The environmental crisis in the South could therefore be pictured as a crisis of 'domination and exploitation' (Laferrière and Stoett, 1999). Following this view, colonial territories were structured to produce primary products at minimal economic cost (with the corresponding adverse environmental impacts), while at the same time increasingly becoming a market for industrial products from the North – the consequence would be a transfer of social surplus value from poor to rich regions (Potter et al., 2008). The relations between underdevelopment and resource extraction and environmental degradation are present, for instance in Stephen Bunker's (1985) work on extractive activities in the Amazon, which related dependency to analysis of flow of energy and matter (see too Blaikie, 1985). The expansion of biofuel production in the South could in turn be considered a further elaboration of this process (Dauvergne and Neville, 2010; McMichael, 2010).

[18] The Dependency School had its origins in the conjunction of Marxist ideas on Latin American and Caribbean and writings about underdevelopment – see Prebisch (1950) for initial ideas about centre and periphery relations in the economic system; Furtado (1964) for the concept of underdevelopment; Frank (1967) who argued that development and underdevelopment are inevitably two sides of the same coin and a reflection of the contradictions of capitalism; and Fernando Henrique Cardoso (who would later be President of Brazil) who rejected a simplistic connection between development and underdevelopment (1969).

The interventionist/developmental state that appeared as a response to 'dependency' has been overtaken by the 'competition state' embedded in neoliberalism and the related 'Washington consensus' of structural adjustment programmes. Some debates focus on the rise of counter-hegemonic ideologies – such as the new economic order (NIEO), or a 'Brasília Consensus' (best exemplified by Lula da Silva's two presidential terms in Brazil, where economic growth and orthodox macroeconomic measures were tied with social priorities, Munck 2003) – against neoliberalism (Paterson et al., 2003). These perspectives, however, by remaining economically-oriented, do not necessarily promote a more socially or environmentally-conscious development. In fact, in the case of Brazil, its recent 'neo developmentalism' (see Chapter 5) has had great, adverse socio-ecological impacts (Zhouri, 2010; Hall and Branford, 2012; Laschefski, 2014; Lisboa, 2014).

Purely political economy-oriented models of development and of Southern emancipation fail to understand, for instance, the discursive use (and its consequences) of biofuels as South-South cooperation tool. They also poorly address the full-range of socio-environmental impacts of biofuel production in Brazil and in the African countries where Brazilian biofuel interests thrive (Dauvergne and Neville, 2010). Inevitably, this underpins a struggle between different meanings attached to development, the environment and biofuels. Political economy approaches could, therefore, be complemented with poststructural analysis of discourses, as well as narratives regarding the environment and development, as the next section will show.

2.3 Discourses, knowledge and power

While struggles over natural resources or the environment involve material aspects, they also involve conflicts over meaning that further complicate already unequal and complex power relations. The importance of social concepts and constructions as drivers or disablers of conflict (Robbins, 2004) has given political ecology a poststructural emphasis to add to pre-existing analyses of material struggles[19]. Given this thesis' concern with biofuel land-use politics, the discursive aspects of environmental struggles, namely how discourses shape and are shaped by local land-use issues, should be taken into consideration.

[19] In political ecology, the epistemological challenge of trying to integrate material and discursive elements can be dealt with via 'critical realism' (see Chapter 3). This approach understands the biophysical world as having an ontological individuality, acknowledging at the same time that our knowledge of that world is incomplete, situational and discursively created (Forsyth, 2003; Neumann, 2005).

While socially-created identities of race (Moore et al., 2003), gender (Rocheleau and Edmunds, 1997; Rocheleau et al., 1996) and ethnicity (Bryant, 2002) offer a wider conceptualisation of politics, the 'social construction' of nature[20] directs our attention to the social origins of environmental processes, concepts, ideas or entities that shape human perceptions and uses of nature (Robbins, 2004). By analysing discourses here - where discourse is seen to be a construction of the environment representing a combination of "narratives, concepts, ideologies, and signifying practices" (Duncan and Barnes, 1992: 8) - political ecology traces the history of these phenomena and their invention, and explores the ways in which different actors construct discourses on the environment and environmental problems, and with what effects.

It is therefore important to understand how those claims about the environment develop and become part of the political and economic systems that create and foster them. One of the ways is through discourses, another through the creation of categories and taxonomies, with which nature is described and ordered (e.g. categories of land-cover, of soils, of forests)[21]. Finally, constructions can be identified in narratives of ecological process and change, where people articulate their ideas of how ecosystems work and reveal their assumptions about how landscapes functioned in the past (Zimmerer, 1993; Robbins, 2004).

Divergent accounts about environmental issues can also be understood as a broader polarisation between North and South perceptions of environmental change that underpin much of postcolonial critique[22]. According to Said (1978), some academic writing and analysis in history, geography, or economics reflect the way scholarship is involved in their colonial or imperial contexts. For Said, these narratives helped justify the domination of one part of the earth by the other, with the inseparable dichotomy knowledge/power tied to Western culture. In the context of imperialism, global hierarchies of subordination and control are enabled by the social construction of differences (Spivak, 1987; Bhabha, 1990; Spivak, 1998).

[20] This is not to say that political ecology seeks an overthrowing of all that is real. Escobar (1998), for instance has highlighted how biodiversity discourses are cultural and political, while acknowledging at the same time that biodiversity has concrete biophysical properties.
[21] For instance the way the Brazilian Amazon region is depicted regarding deforestation: there is a 'Legal' Amazon (*Amazônia Legal*), the Amazon hydrographical basin, or the Amazon biome, which encompasses forested and non-forested ecosystems (Walker, 2011).
[22] Postcolonial critique can also be applied to neo-Malthusian explanations of environmental crisis (see 2.6 below), new forms of colonialism based on globalisation (see 2.7 below), the interrelations between states and TNCs (see 2.2 above and 2.4 below), and neo-liberal environmentalism (see 2.2 above).

In postcolonial times, ‘development’ as a discourse, for instance, can be introduced by institutions in a way that a given country is discursively constructed with little acknowledgement of its history or the political-economic status of its territory (Ferguson, 1990; Li, 2007). According to Escobar (1995), concepts of ‘global poverty’, ‘underdevelopment’ and the ‘Third World’ were produced in post-war development discourse as objects to be managed by the use of modern technological practices from the ‘First World’. These practices project into the daily lives of people, thus enabling control of vast areas of the South by the North without need of political repression as in formal colonial times (Escobar, 1996).

Closely related to such ideas is the discourse of ‘sustainable development’. Vigorously debated (e.g. Dryzek, 2005; Redclift, 2005), it is promoted by governments, business, and science, while being criticised for maintaining the assumptions - about society, science, technology, development, and the environment - which are supportive of the *status quo* (Escobar, 1996; Carvalho, 2001).

More a slogan than an analytic concept, by joining development with environment protection, sustainable development can be seen as an example of convergence of Northern and Southern aspirations in international environmental negotiations, attained in the United Nations Conference on Environment and Development in Rio Janeiro in 1992 (Najam, 2002; Clapp and Dauvergne, 2005; Williams, 2005). Yet, an inherent problem here is the different meanings attached to ‘development’ or a ‘certain level of wealth’ that entail North/South equity questions requiring political negotiation (Giddens, 2011).

Meanwhile, and related to the neoliberal trend in environmentalism, ‘ecological modernisation’ is a discourse of environmental governance that tries to reconcile economic growth with solutions for environmental problems (hence somewhat overlapping with sustainable development). However, it avoids addressing the social contradictions at the root of environmental problems and is enacted by governments as a normative discourse to manage environmental conflicts (Hajer, 1995). Given its focus on improving the environmental efficiency of industry and resource exploitation, ecological modernisation is hardly serious in ecological terms (Blowers, 1997; Christoff, 2000).

This discourse is deeply rooted in science and technology, institutionalised and articulated by public and private actors at different scales (Backstrand and Lovbrand, 2006). It also reflects unequal North/South relations as it is typically based on the Western experience. Hence, implicitly or explicitly,

it promotes the simplistic division between 'traditional' and 'modern' societies, which in turn helps deepen the 'core-periphery' relationships between North and South (Christoff, 2000).

However, if we consider the case of biofuels and modernised tropical agriculture generally as a manifestation of ecological modernisation, it becomes clear that technologies can emanate from the South (Martinez-Alier, 2002; McMichael, 2010). A shift of 'knowledge-power' to parts of the South – the case of biofuel and tropical agriculture reveals Brazil as a main 'knowledge broker'[23] – can be explained by a new pattern in global political economy characterised by an increased role for the more powerful developing states (Dauvergne and Neville, 2009). The previous patterns of destructive trends of resource exploitation nonetheless continue.

This emphasis on science and technology leads us to the question of science's (instrumental) role in defining environmental problems and the role of scientific knowledge as power. Much of the work in political ecology here follows a poststructural trend of critically evaluating the taken-for-granted scientific claims about environmental change. Considering that scientific knowledge and political order are co-produced (Lidskog and Sundqvist, 2002), the acquisition, dissemination and legitimisation of knowledge about the environment can be politicised and reflect (unequal) power relations (Neumann, 2005, see too Budds, 2009). This entails questions of whether scientific data – e.g. on land cover, reports on climate change impacts, classifications of forestland by amount of carbon stocked, or studies on biofuel impacts and benefits – are free from bias.

However, science can become apparently depoliticised, for instance regarding the 'consensual' presentation and mainstreaming of global threats such as climate change - a 'post-political' environmental consensus. The paradox is that while climate is politicised as never before and put high on the political agenda, the public stage has undergone a process of depoliticisation with the triumph of a 'subpolitics' of scientific expertise. This means that there is a shift from politics – ideology and principles – to expert-driven 'subpolitics' in which social interaction is depoliticised (Beck, 1992; Swyngedouw, 2010).

Bearing these considerations in mind, it must be acknowledged that the purpose, elaboration and implementation of the biofuel and deforestation control policies analysed in this PhD are shaped by

[23] Litfin (1994) referred to 'knowledge brokers' as the ones who influence the adoption of policies through the exploitation of the discursive nature of science and politics.

environmental narratives and political discourses, which reveal unequal power relations and a significant role of a politicised science. In addition, a particular kind of knowledge – geography – used by nation-states to control sovereignty over their resources and territory, has a particularly relevant impact on human-environment relations, as material and discursive territorial practices influence the access, control and use of natural resources.

2.4 Geography and power – a critical geopolitics approach

Critical geopolitics is a research agenda that probes the ideas behind political practices linked to the control of space, and the political representations of space, especially by disclosing discursive practices of intellectuals of statecraft (Mamadouh and Dijkink, 2006). At the boundary between political geography and international relations, it is an interdisciplinary project unified by its rejection of classical and post Cold War geopolitical reasoning and by its implicit questioning of contemporary neoclassical projects (Dodds, 2001)[24].

The target of criticism – 'traditional' geopolitics – studies the state, the state system, and inter-state relations as well as the issue of borders (Heffernan, 1998). By doing so, it provides a geographical way of perceiving the world (e.g. territorial location and access to resources) to frame the analysis of national and international politics (Dodds, 2005). It is also seen as an instrument for legitimising militarised action (see for instance Lacoste, 1976).

The term geopolitics was first used in 1899 by the Swedish political scientist Rudolf Kjellén to designate a new sort of geographic power reasoning that arose in the capitals of the 'Great Powers' amidst a *fin de siècle* transition that consolidated Eurocentric colonialist hegemony in the world (Tuathail, 1996). This period saw a shift in the perception of world geography and politics as the last 'unclaimed' land was territorialised and enclosed by colonial empires. The texts of Mackinder, Spykman, Ratzel and Haushofer are the best examples of this period. As a consequence of World War II and the role of the German school of geopolitics in explaining Nazi foreign policy, the term's use went into decline (Mamadouh and Dijkink, 2006).

[24] It should be noted, however, that its criticism of traditional classical concerns is mostly a Western tendency, well established within the journals *Political Geography* and *Geopolitics*, but which could be seen as a continuation of seeing things through a Western or Northern prism and may not have the same importance or resonance in developing countries (Dodds, 2001).

Geopolitics has nevertheless retained some significance in Central Asia (Megoran, 2010) and in military academies in South America[25], where it was used to shape national security doctrines that supported their activities. Recently, there are neoclassical resurgences[26] such as Kaplan's 2009 *The Revenge of Geography*, James Bennett's (2004) *Anglosphere* and Everett Dolman's (2002) *Astropolitik* (see too Marklund, 2015, on *The Return of Geopolitics in the Era of Soft Power*).

The use of geography as a power tool (or geo-power)[27] is, however, much older. At least since the early voyages of discovery and the establishment of the first European empires, geographic knowledge figured prominently in the 'discovery' and control of lands, resources and trade, contributing to the expansion of 'modernity', of the nation-state system and of capitalism (Hecht and Cockburn, 1989; Slater, 1993; Sidaway, 2000; Dalby, 2002). Modern geographical knowledge should thus be situated within the power relations that framed the centralisation and imperialistic expansion of European powers and the nation-state system (Tuathail, 1996).

Besides this external or 'expansionist' role, geography as a power tool can also be considered as an internal premise for the establishment and functioning of the Westphalian state[28]. According to Tuathail (1996), and drawing on Foucauldian notions of power-knowledge relations, geo-power is a fundamental element of state formation. It thus functions as a set of technologies of power for the governmental production and management of territorial space. While Foucault did not directly grasp the issue of territory, he offered a useful way of understanding the relation between governmental practices and territory – namely through his genealogy of the art of government and the form of state, especially "how space is rendered subject to mathematical modelling and control, and thought politically" (Elden, 2007: 32).

The formation of individual nation-states was the outcome of a conjunction of social, economic and cultural factors, and their existence depended upon the creation of conditions to bond the territories and peoples being governed into the indivisible entity called 'nation'[29] (Barman, 1988). With a sense

[25] Hepple (1992), for instance, has shown how the Brazilian military dictatorship used a Ratzelian metaphor of the 'organic state' (see Chapter 5).
[26] Neoclassical geopolitics is defined by Megoran (2010: 187) as "ways of thinking about the effects of geography on international relations that explicitly locate themselves within the Mackinder–Haushofer–Spykman tradition, but which creatively rework it with reference to changed social, economic, political and cultural factors".
[27] Power and knowledge, following Foucault, are dialectally connected, so that the histories of knowledge should be positioned within the historical and geographical context of power relations (Dean, 1999).
[28] The nation-state model is "a polity admitting no external control or authority over its actions and possessing immediate and untrammelled power over a contiguous territory occupied, in theory, by a population homogeneous in speech, culture and ethnicity" (Barman, 1988: 1).
[29] With 'nation' being a relatively subjective, normative concept (see below).

of territorial identity and control, the nation-state system claimed absolute territorial sovereignty thereby replacing the feudal system of personal loyalty (Anderson, 1997). Boundary making and related geographic apparatus were necessary for such control and a crucial step in nation-state establishment, by delimiting each nation-state's sovereign territory. Borders here, thus, should be seen more as a belief, an imagination that creates and shapes the world, i.e. a social reality, rather than a material artefact (Van Houtum, 2005). Thus the relevance of the verb 'B/ordering' – "making 'others' through the territorial fixing of order" (Van Houtum and Van Naerssen, 2002: 134).

It is not unexpected, therefore, that border and territorial disputes have been major themes in geopolitics and in international relations (which is still organised around the Westphalian concept of nation-state), as well as conflicts over transnational natural resources or control of key strategic resources. However, geopolitical practices and discourses are not only concerned with inter-state relations but are often important too for internal logics of occupation and exploitation. Here, borders are not only 'built' to protect a country's territory from foreign hands, but also to enclose and control resources all the better (see 2.5 below). The significance of the internal in geopolitical formulations has been asserted by different authors (e.g. Lacoste 1987 on geopolitics in Africa, Sidaway, 1991 and 1992, or Becker, 2005, on the relations between space and power in the context of the colonisation of the Amazon region). The object of geopolitical reflection should be therefore seen as "an imbrication of spheres, or an interlocking of 'global', 'national', 'regional' and 'local'" (Slater, 1993: 420).

The typical focus that geopolitics has given to borders and to inter-state disputes in a system of state-delimited identities is minimised in contrast by critical geopolitics in favour of the importance given to power struggles between different social groups over materially or discursively produced geography, space and territory. As these disputes over power and resistance establish discursive borders between an idealised 'Self' and a demonised 'Other' (Tuathail, 1996), geography is therefore not just a battle of cartographic technologies, but also a contest between different ways of envisioning the world, the perfect example being the clashes occurring in the colonial frontier, and still relevant, for instance, in contemporary Brazil (Hecht and Cockburn, 1989; Levi-Strauss, 1992; Ribeiro, 2000; Porto-Gonçalves, 2012a).

As Said (1993: 7) has written, "Just as none of us is outside or beyond geography, none of us is completely free from the struggle over geography. That struggle is complex and interesting because it

is not only about soldiers and cannons but also about ideas, about forms, about images and imaginings". The deployment of modernisation theory in developing countries, for instance, reflected a 'Northern' will for geopolitical power and discursively legitimated numerous interventions and penetrations that sought to subordinate and incorporate the 'Other' there (Slater, 1993).

Even as traditional analyses of geopolitical practices and discourses focus mainly on the nation-state, the Westphalian notion of a world of borders and sovereign states is challenged by critical geopolitics, as it views economic and ecological phenomenon as connections that flow across boundaries (Tuathail, 1996). Agnew (1994) has called the geographical assumptions of states as fixed units of sovereign space the 'territorial trap' and called for a new approach avoiding the duality domestic/foreign and seeing states as 'containers' of societies. Sovereignty should therefore include more than just statehood (McConnell, 2010) and geopolitics should pay attention not just to the nation-state but also to the local and global spheres (Newman, 2010) as well as to private actors and political organisations (Agnew, 2010) and indeed the internal diversity of (changing) interests inside the nation-state (Moisio and Paasi, 2014).

This overarching approach links the practices of statecraft to globalisation, information networks and cultural and economic transformations and gives significant relevance to geoeconomics (Mercille, 2008; Moisio and Paasi, 2013). These questions of state autonomy *vis-à-vis* capitalism emphasise a main theme in critical geopolitics and political ecology – the (perhaps diminishing) role of the nation-state amidst globalisation (Newman, 1998; Mercille, 2008) and its transformation into the 'neoliberal state' (Joronen, 2013).

In addition to this broadening of geopolitics, critical scholars have engaged in new types/derivatives of geopolitics. Thus, formal geopolitics studies grand narratives by academics and advisors of statecraft; practical geopolitics investigates policy-making and foreign policy actions (see O'Tuathail 2008 on South Ossetia); popular geopolitics meanwhile studies if and how the public arena and the media supports and legitimates foreign policy (Mamadouh and Dijkink, 2006). The latter concerns the geopolitical manifestations found in the visual media, news magazines, radio, cinema, novels, cartoons or the Internet where particular geopolitical reasoning may resonate (Dittmer and Dodds, 2008).

Popular geopolitics also considers how broader public cultures, with their specific historic and geographic contexts, help to shape discourses and representations of national identity and global politics (Dittmer and Dodds, 2008). These constitute 'geopolitical cultures' - cultural and organisational processes that conceptualise the nation-state, its identity and its position in the world, notably shaping thereby the way foreign policy is made by states (Dittmer and Dodds, 2008).

Examining popular forms of geopolitics, and its interaction with state-led forms, is important to understand the reproduction of nations as 'imagined communities' (Anderson, 1991) in everyday life and to understand the role of historical and cultural fantasy in determining state identities as well as international politics (Dodds, 1996; 2001). The concept of 'nation', as noted above, is a fundamental step in the establishment of nation-states. However, being a normative concept, it 'exists' only if a sufficient body of individuals agrees that it does, and hence offer support for a nation – 'nationalism' – is hence by definition emotional and subjective (Barman, 1988). Nationalism, as well as religion, can both be perceived as adherence to serial narratives, as forms of fan-based identities whereby geopolitical meanings are both absorbed and produced by audiences as they consume popular culture (Dittmer and Dodds, 2008; see too Dittmer, 2008, on evangelical geopolitical visions).

Here 'Brazilian nation' is not to be understood as a stable entity but composed of different actors united around the idea of an imagined community, which has been raised with the building of the nation-state. Foreign policy in this regard not only creates alterity – the 'us against the others' – but also constructs domestic social orders and secures identities. The state has here the key role of boundary construction so as to separate the self from the other (Dodds, 1993) – the role of natural resources and the representation of a naturally endowed country (and to a certain degree the myth of racial democracy) are crucial components of this Brazilian national construction (Holanda, 2000 [1959]); Carvalho, 1998; Chauí, 2000; McNee, 2014).

Understanding nations as imagined communities with particular geopolitical cultures that shape national practices and discourses, as well as international diplomacy, can thus be better grasped through the critical study of both popular and practical forms of geopolitics (intertwined as they are). The sovereign control of a nation-state's territory has here a particular relevance, the implications being twofold: the territory (either in its material or immaterial aspects) shapes the geopolitical culture of a nation (e.g. 'natural richness' in Brazilian geopolitics); but the geopolitical culture in turn shapes

the territorial practices and discourses involved, for instance, in natural resource classification, enclosure, control and use.

2.5 Geopolitics and natural resources

The geopolitical practices intended to delimit, control and allocate natural resources, as well as the employment of discursive formations designed to make 'known' in a certain way selected resources (including natural resource categorisation or narratives about resource management) must be taken into consideration to fully understand the dynamics around human-environment relations. The issue of 'availability' of land, for instance, for the production of energy crops, is therefore quite likely politicised.

The definition or categorisation of a natural resource may hence not be consensual at all, leading to material or discursive fights over it. Hence, a plot of land may be more or less 'productive', but its identification as appropriate to agricultural production or as marginal/wasteland fit for other purposes brings forth a discursive element underpinning an instrumental use of knowledge. Furthermore, environmental policies aiming at regulating natural resources exploitation may be interpreted in differing ways by different actors (e.g. Steward, 2007, on a critical analysis of 'sustainable soy' in Brazil) as they may hold different views, for example, on forest values and appropriate use.

Different perspectives harboured by social actors in a particular region are mostly due to the distinct relations of each one with selected natural resources (Giarracca, 2003). Landowners may consider land just as another commodity (Teubal, 2009), while it can also be considered a factor of production and a non-marketable family asset (El-Ghonemy, 2003), or a cultural resource that shapes social identity and power relations within communities (Akram-Lodhi, 2007). Silva (2007) in turn pointed to the differences between farmers and peasants here, as the former would see the land as 'territory-commodity', while the latter would perceive it as 'nature-habitat', sustaining their livelihoods. Furthermore, the emotional and mythical relations with a landscape, and not its economic value, may be fundamental to the way rural populations define themselves, their relations within communities and also their cultural background (Abramson and Theodossopoulos, 2000).

The concepts of territory and territoriality are key here and enable a better understanding of the relations of populations with their surrounding environment. The former consists of a social appropriation of space and the dimensions thereby implied (symbolic, material and power dimensions;

see Haesbaert, 2002). The latter refers to the way through which a given social group lives and experiences the space-territory, so it is a historical product of social and political processes (Silva, 2007). Alternatively, as Paul Little (2002: 3) stated: “territoriality is the collective effort of a social group to occupy, use, control and identify with a specific parcel of its biophysical environment”.

The practice of territorialisation in turn corresponds to land claiming and associated managerial practices carried out notably (but not only) by states (Peluso and Lund, 2011). As a means of control of people and resources, it is not just a ‘production of space’, because it involves claiming (Vandergeest and Peluso, 1995) and is a part of both governance and the disciplining practices associated with governmentality. In this sense, territoriality creates and sustains power relations among environmentally governed subjects and between them and the state (Agrawal, 2005; Li, 2007). Territoriality then can be seen as an explicit move ‘to control’ by claiming the power to govern territorially (Peluso and Lund, 2011).

As this thesis is concerned with decisions on how to use land – whether for food, biofuel production or forest preservation – it becomes evident that ‘who’ owns the land, and ‘how’, as well as the meanings attached to land are crucial. This is especially relevant in Brazil given the historically unequal access to land, frequently leading to violence in many rural areas.

Literature on natural resource geopolitics has explored how discursive and material struggles over natural resources may become violent. More classical approaches are concerned with the arguments that link resources with particular conflicts (e.g. over resource access) and acts of violence (e.g. militarisation of resource-rich areas). According to Le Billon (2008), these conflicts can be spatially perceived in terms of scarcity (the relative distribution of natural resources) as well as in terms of identity-related legacies (e.g. who controls what and where).

Nevertheless, the linking of ‘war’ – from its discursive use to actual planned physical violence – to resource control and exploitation has been one of the main debates in natural resource geopolitics (Le Billon, 2008; Dalby, 2009a; Homer-Dixon, 1999). In this regard, Homer-Dixon’s (1999) powerful if hotly contested view sees a close relation between resources and war. ‘Environmental scarcity’ is herein depicted as the scarcity of renewable resources such as cropland, freshwater, and forests instigated by the degradation of renewable resources, the growing demand for these resources, and/or their unequal distribution, and can contribute to civil violence. However, Homer-Dixon

considers that environmental scarcity is not sufficient, by itself to cause violence, and when it does contribute, it does so by interacting with other political, economic and social factors (such as commodity markets, pre-existing ethnic divisions and others) to generate severe social effects that in turn support violence.

This dependency upon a much wider set of variables is also highlighted by Le Billon (2008), who stresses the importance of resource-based processes of peripheralisation and uneven development, the role of resource narratives and the links with the materiality of resources (Le Billon, 2008). A further critical note is provided by Dalby (2002), suggesting that the neo-Malthusian arguments of environmental security linking conflicts to population growth are originated in geopolitical assumptions of a rich North that knows how to master nature and a poor, incapable South.

Moreover, contemporary conflicts over resources are oversimplified when they are not framed in the historical context of natural cycles, ecological change, and historical colonisation activities, as well as the 'industrial imperialism' of the last two centuries (Dalby, 2002). This so-called imperialism has accelerated and extended the changes that started with the first shock between 'modern'[30] and 'primitive worlds' and that has ever since maintained a pattern of seeking land and food by conquest and violence (Levi-Strauss, 1992; Ribeiro, 2000; Dalby, 2002;). Current land-use practices and relations are therefore a product of the settlement history, and the legacy of colonial control over land (Bryant, 1997; Tropp, 2003; Steward, 2007). Historically-rooted interpretations of land conflicts on the modernity frontier (such as the agriculture frontier in the Amazon) may thus explain much more about contemporary patterns of environmental change as a generator of conflict (Hecht and Cockburn, 1989; Dalby, 2002; Becker, 2005).

The concept of frontier itself is indeed an evolving and highly contested one. Contemporary frontier theses are distinct from earlier frontier theses in the USA, for instance Turner's 1894 *The significance of the frontier in American history*, whereby the origin of an alleged egalitarian, democratic, aggressive and innovative American character reflected the American frontier experience (2007)[31]. While acknowledging the significance of the frontier in contemporary Brazil, frontier theses about the Amazon are mostly based on political economy arguments, whereby the frontier is conceptualised as

[30] 'Modernity' here is used to refer to the broad set of social structures and practices emerging originally in North-West Europe but gradually becoming globalised over the last several centuries (Saurin, 1994).
[31] In the same tone – whereby the 'physical dimension' is integrated into narratives of nation building to explain the shaping of the population's character – see the Brazilian Sérgio Buarque de Holanda, notably *Roots of Brazil* (2012, originally published in 1936) and *Extremo Oeste* (1986).

the absorption of peripheral regions by an expanding capitalism (Cleary, 1993), or more anthropological stances about the clash of different civilisations[32].

The first encounters between Europeans and others during the so-called Age of Discovery have produced a modern/backward and European/non-European schema for dividing up the world that has influenced and still influences modern geopolitical discourses (Agnew and Corbridge, 1995). The 'great transformation' on this colonial frontier is still in process through globalisation and the development agenda (Hecht and Cockburn, 1989; Levi-Strauss, 1992; Escobar, 1995; Becker, 2005) with large-scale and systematic degradation of natural resources occurring from modernity's "normal and mundane" practices (Saurin, 1994: 62).

The complex workings of the international financial system, the capitalist encouragement of export agriculture, and elite manipulation and appropriation of resources add more complexity to the resource conflict equation which requires an analysis away from straightforward, simplistic and non-contingent approaches. A political ecology approach (see 2.1 above) to better understand conflicts, environmental change and related policy issues would, however, enable understanding of resource-capture processes in their larger political and economic contexts, notably encompassing resource ownership and control.

From an accumulation of empirical studies on this issue (e.g. Carney, 1993), political ecology has elaborated the 'environmental conflict thesis', whereby

> increasing scarcities produced through resource enclosure or appropriation by state authorities, private firms, or social elites accelerate conflict between groups (gender, class, or ethnicity). Similarly, environmental problems become 'politicised' when local groups (gender, class, or ethnicity) secure control of collective resources at the expense of others by leveraging management interventions by development authorities, state agents, or private firms (Robbins, 2004: 173).

This more comprehensive approach helps explain why some resource-rich countries, such as Brazil, face persistent resource conflicts. In fact, the struggles over land possession that have historically occurred and still occur in this country are an example that scarcity is not always the driver of conflicts - in the Brazilian case the unequal distribution of the resource is the main factor contributing to

[32] Martins (2009), for instance, makes a distinction between the 'expansion front' (expansion of 'civilised' populations and their economic activities regulated by market), coming into contact with tribal territories; and the 'pioneer front' (expansion of capitalist productive activities).

conflicts (Wolford, 2010). According to De Soysa (2002, 2005), violence and access to resources might be related to abundance rather than to scarcity - the fights between elites to control the revenues gained by from extraction and export of resources may better explain the violence than Malthusian assumptions of resource scarcity (see too the Brazilian classic novel *The violent land* by Jorge Amado, 1943, and De Castro, 1952).

A key concern of political ecology has therefore been to analyse the ways in which the structure of property rights influences access to resources and land (Watts, 2004), with consequent implications for land degradation, sustainability, and equity (Robbins, 2004).

As Lawlor et al. (2009) add, clearing a forest in some countries can be a key way to establish property rights and demonstrate 'productivity' (in Brazil this relates to the *uti possidetis* practice; see too Bjureby 2006 on the Shuar people in the Ecuadorian Amazon), but it usually does not promote environmental or long-term economic sustainability, as such property rights regimes provide incentives to develop agriculture and plantations at the expense of previously biologically rich forests (Dauvergne and Neville, 2010). Earlier works by Mackenzie (1989), Carney and Watts (1990), Becker (1990) and Davison (1987) have for instance provided empirical evidence in Africa of the complexity of access to land and how the multiple, overlapping rights combined with formal and informal tenure, produced a complex web of dependencies (see too Bryant, 1992 and Blaikie, 1989).

Agrarian conflicts involve current societal relationships but also emerge out of historical struggles for control and can affect the environment especially in resource scarcity conditions. Agrarian science scholars have shown how property relations can lead to class exploitation, as social interactions are rooted in "deeply unequal social relations" (Da Corta, 2008: 6), and can be seen as having a dependent trajectory. Power relations and regional elites, for instance in Brazil, seem to shape the concentration of power in the sugar sector (Lehtonen, 2009). This sense of inevitability makes it possible for more privileged groups to benefit the most from shifts and opportunities in the global markets, such as the current surge in interest in biofuels, further worsening the vulnerability of the least socially and financially affluent, as these global trends affect local social relations in complicated ways (Dauvergne and Neville, 2010). The study of the land dynamics surrounding biofuel production needs therefore to better understand the existing ownership and labour regimes and in what kinds of commodity chains biofuel production is integrated (White and Dasgupta, 2010); or how it changed the

process by which agribusiness and the peasantry acquire and use land (in the case of Brazil, see Fernandes et al., 2010).

The role of the nation-state is crucial here, as it establishes the regulatory framework of property rights over resources such as land, even as it can also be involved in the creation and resolution of conflicts over resources and in the definition and categorisation of resources (see for instance Emel et al. 2011 on the attraction of foreign investment for gold mining in Tanzania and the consequences for the sovereignty of the country and for local populations; see too Bridge, 2013). As Hecht and Cockburn (1989) have shown for the Brazilian Amazon, export markets for cattle and other agricultural commodities were not the only drivers of degradation – it was also the outcome of state-directed 'class war' (joined by a local entrepreneurial class) against indigenous communities, impoverished miners (see Cleary, 1990, on the gold rush in the Brazilian Amazon), petty extractors, and rubber-trappers (see too Browder, 1988, on the impacts of public forestry policies in the Brazilian Amazon; and Hall, 1989, on the socio-environmental conflicts caused by the state-led development of the Grande Carajás Project).

A state strength in determining the fate of natural resources generally involves the authority of central states over local elites in control of the appropriation and extraction of those resources, along with the ability of the state to penetrate society and regulate social relationships (Dauvergne and Neville, 2010). While decentralisation can sometimes make states "more locally legitimate" (McCarthy, 2010: 97), it can also be seen as a politics of accommodation, when states concede control to local powerful actors and lack the capacity (either coercive or administrative) to keep control (Migdal, 1988). Natural resource sovereignty cannot, however, be circumscribed within the national scale and within the nation-state apparatus, but needs to take into account as well interdependencies between TNCs, foreign capital, landlords and the nation-state in the accumulation of resource wealth (Emel et al., 2011).

Current geopolitics involved in such land dynamics is therefore a struggle of contested meanings and unequal power relations, intensified with the transformation of native ecosystem or food agricultural production towards biofuel production. The biofuel rush and the 'food, energy and environmental trilemma' (Tilman et al., 2009) brought about by new competition for land (Harvey and Pilgrim, 2011) is composed of conflicting commitments and objectives that reflect the need for a reflexive capacity in

the strategic management of the natural endowments of a country. Brazil would be here an exemplary case (Harvey, 2014). This is, in turn, to be framed in the context of a global picture where questions of energy and environmental security amidst growing uncertainty and fear about the future of the earth's ecological and social systems are of paramount relevance.

2.6 Environmental and energy security

Directly connected to the biofuel quest and to climate change concerns is the notion of energy security and fears regarding 'peak oil'. The drive to develop alternative energy sources to polluting fossil fuels contributes here not only to energy security but also reduces GHG emissions, for instance in a transport sector that uses biofuels.

There is no unanimity regarding 'peak oil'[33] conditions. The calculation of oil reserves depends upon calculations of the 'ultimate reserves' a given country or oil field has (how much oil can be extracted and how much oil exists) (Giddens, 2011) - oil reserves are thus far from stable objects as they can be used as political instruments in strategic projections, and they can also be artefacts of the scientific community (Bridge, 2010). In any case, the panorama of depletion helps rationalise a diversity of projects such as investments in fuel efficiency and renewable energies (e.g. Brazil's biofuel programmes), or the opening up of new areas for fossil fuel development (e.g. Alberta's tar sands, shale gas in the USA, or the pre-salt reserves in Brazil). The development of these new 'frontiers' of fossil fuels illustrate how previous forecasts of peak oil in the end did not actually correspond to an important constraint for the global supply of fuels (Bridge, 2010)[34].

The problem of oil, however, is not only a question of quantity but also a geopolitical, of relational geographies of oil production and consumption (Bridge, 2010; Bridge et al, 2013). Geographical factors, such as the distribution of centres of supply – fossil fuel reserves and alternatively agrarian potential for the development of biofuels – and demand, influence the strategies to attain affordable and reliable supplies of energy (Bradshaw, 2009). Struggles for access to diminishing oil resources

[33] Refers "to an impending, permanent decline in the production of so-called 'conventional' oil as geophysical limits on its availability begin to bite" (Bridge, 2010: 523).
[34] And here more recent developments, notably with shale gas in the USA have already contributed to the change of the global geopolitical order.

thus occur amidst a growing consumption, mainly due to emerging economies' growth and adoption of modern, Western lifestyles (Bradshaw, 2009)[35].

In addition to energy security fears, the global character of environmental problems poses serious social risks, as all areas will be affected by problems such as ozone depletion, deforestation, biodiversity loss, climate change, and pollution. Contextualised under the 'postmodern disorientation' – that resulted from both the effect of the end of the Cold War and the changes brought about by globalisation on the structure of the social world and their geopolitical imaginations – these issues present a challenge to nation-state's sovereignty and societies in general (Tuathail, 1996; 2000).

A discourse of 'environmental security' groups together the threats posed by environmental problems to human societies in a logical manner but the very definitions of 'threat' and 'security' are the focus of substantial criticism in the geopolitics literature (e.g. Dalby, 2009b). According to Tuathail (1996), these problems are spatialised by contemporary forms of geo-power based on the fears of affluent societies. Dalby (2002) has suggested that risks and threats are inevitably socially mediated political constructions, while Grove (2010) contends that calls of danger, by delimiting who or what is threatened and what is threatening, are themselves powerful 'political resources' that construct identities, that represent power relations, and that legitimise particular lifestyles. While the origins of this concept may be more related to the attempts by environmentalists to gain attention and money for environmental problems on the global political agenda, it now resonates more with the interests of state elites, particularly within the military and with dominant discourses concerning the priorities of state decision-makers (Paterson, 2001).

As global risks like environmental degradation, climate change and terrorism are mostly unpredictable and hence considered to be beyond the control of institutions, political and scientific elites must confront unprecedented concerns (e.g. Villar and Ribeiro, 2009, on the environmental risks facing the Guarani aquifer in Brazil). These result from the unanticipated consequences of human-induced change – 'planetary re-engineering' (i.e., the 'terraforming' of nature by industrial colonisation). In fact, the changes to the 'natural' systems were not planned and it is uncertain how this system's different pieces will fit together coherently. They were changed on such a scale that a new geological era, 'the

[35] A reflection of this struggle for a diminishing resource is the America-Chinese competition in the Middle East and Africa or the interest of Russia in the Arctic and Central Asia (Giddens, 2011). At the time of the submission of this PhD, global economic uncertainties, including in the emerging economies, has depressed drastically oil prices. Yet, arguably, the longer term trend remains in place.

Anthropocene' may well have been inaugurated (Dalby, 2007). Knowing and predicting the risk (e.g. which will be the local impacts of climate change upon a given agriculture crop) becomes an issue of paramount importance, hence prompting a greater role for scientific knowledge and its 'subpolitics' (whereby political consensus regarding climate change makes this issue 'apolitical' and expert-driven), that Beck (1992), Swyngedouw (2010) and Giddens (2011) speak of.

As climate change policy impacts a great diversity of human activities ranging from demographic change to the functioning of monetary systems (Vogler, 2000) - as Skolnikoff (1993: 183) has observed, "global climate change is the apotheosis of the idea that 'everything is related to everything else'" - nation-state planning must ensure that there is political convergence, with climate change policy holistic and integrating economic and environmental policymaking (Christoff, 2005; Paterson et al., 2005).

The territorial practices referred to in the previous section aimed at controlling natural resource exploitation have here a key role as 'new' energy and environmental security fears bring additional pressure to bear on a nation-state's ability to 'control' territory and population. Protecting the environment or preventing dangerous climate change widens territorial control objectives. Disciplining the use of land and enforcing the rule of environmental law could in turn be considered an enlargement of biopower (governing humans as living creatures) from only a human population to the whole ecological system (Oels, 2005). Following the Foucauldian notion of governmentality[36], government is the conduct of conduct (hence not limited to the state but enacted in all segments of society) and implies not only power and authority relations but also questions of the 'self' and of identity (Dean, 1999). Agrawal (2005) provides here the useful linked concept of 'environmentality' whereby positions adopted by 'environmental subjects' appear as a result of involvement in power struggles over natural resources, being a crucial element in the state's efforts at making the population comply with environmental policy.

In order to control, say what citizens do with their waste or whether farmers maintain legally-mandated forest reserves in their holdings, technologies of power are enacted. Particularly relevant

[36] Governmentality refers to the mentality of government. Very briefly, it underscores "the way in which the thought involved in practices of government is collective and relatively taken for granted, i.e., not usually open to questioning by its practitioners" (Dean, 1999: 16). Involved here are rationalities of government, different forms of knowledge, technologies of government and the making of subjects – all contributing to the way authority and power unfold on the ground.

here is the notion of Panopticon[37]. Drawing on Foucauldian notions of biopower, the Panopticon can be considered a diagram of disciplinary power by the State, and a useful concept in questions about the effective control of the State over natural resources, e.g. today through satellite imagery (see chapters 4 and 8).

However, controlling gobal risks such as climate change (by, for example, enacting deforestation control strategies such as in the case of Brazil) mean that inevitably tensions arise between domestic objectives and global 'good-will'. In fact, how far is a nation-state willing to tackle global risks, and how are these risks perceived domestically *vis-à-vis* other priorities such as agricultural development? The case of Brazil is paradigmatic here. These tensions have seldom been addressed namely in what concerns tackling the land-use impacts of biofuel production on deforestation control objectives. Hence, it is important to understand the reasoning behind controls and its connection to the strategies of a nation-state in international environmental negotiations.

Given that deforestation in the Amazon has wider global effects, a wider approach is needed, with environmental governance becoming 'collaborative' or 'post-sovereign' (Karkkainen, 2004), as the interdependence of nation-states undermines the traditional Westphalian notion of sovereignty (Biermann and Dingwerth, 2004). Global environmental change is inherently transboundary, thus making it necessary for nation-states to cooperate in order to effectively fulfil their functions, for instance through bilateral or multilateral environmental agreements (Biermann and Dingwerth, 2004).

This 'post-sovereign' environmental governance may also be affecting the regimes of territorial legitimisation of modern states. Arnauld de Sartre and Taravella (2009), for instance, have argued that the anti-internationalisation narrative about the preservation of the Amazon in Brazil is translated into an on-going struggle between two national actors: the federal state and the local bourgeoisie. Moreover, these changes in territorial legitimation practices may imply the exclusion of local communities through the politics of nationally centralised or bilateral scale-making, as Hughes (2003) and Wolmer (2003) have demonstrated on transboundary conservation projects in the Southern African states.

[37] It was a kind of institutional building designed in the 18th century by Jeremy Bentham. It consisted of a circular structure with an 'inspection house' in the middle. From that inspection house, a sole 'watchman' was able to observe all the internees, without them knowing they were being watched.

Global risks may thus force nation-states to respond and make choices among competing land-uses or policies, or, indeed, implement control apparatus in order to tackle those risks. These, in turn, are not just under any one nation-state's control but are increasingly intertwined with international economy considerations as well as global environmental governance. Whether or not multilateralism marks a loss of national sovereignty, it is on the international stage that most of the measures to combat climate change have been drawn through cooperation among nation-states. National deforestation control and biofuel policies will therefore result from a balance of sovereignty gains and losses in the international negotiations 'game'.

2.7 The international politics of climate change

The emphasis on environmental and energy security may be seen as colliding with international cooperation, as security is seen as divisible, fostering a competitive struggle for resources, and an increase of the already existing divisions (Giddens, 2011). The alternative, yet not mutually exclusive, is the approach that privileges international institutions, cooperation and multilateralism for dealing with global environmental risks that escape nation-states' *marge de manoeuvre*, such as the challenges presented by climate change.

The nation-state is still important for climate change action domestically in implementing environmental regulations (Hudson, 1998), and despite the neo-realist claim that international institutions are weak (e.g. Kagan, 2009), the transnational character of this problem and the interdependence of the world brought upon by globalisation, makes international cooperation crucial. Furthermore, international environmental cooperation has an important role of norm creation, enables the generation and dissemination of scientific knowledge, fosters capacity building, and allows for the provision of a multilateral regulatory framework (Vogler, 2005).

Mainstream international relations theories – neorealism and neoliberal institutionalism – have mostly seen global environmental problems as a result of the absence of a global government to control the use of global commons[38], following Hardin's (1968) 'tragedy of the commons' argument, and have focused on ways of dealing with it. While the environmental security of states, the pursuit of power, and the instrumental use of environmental regimes have been the main focus of the former, neo-

[38] The 'public good' qualities associated with global sinks, such as the atmosphere (conferring air quality and a stable climate, but also serving as a common sink where waste from human activities is disposed) are very difficult to regulate, as the anthropogenic sources of degradation are spread over different national jurisdictions (Vogler, 2000; Soroos, 2005).

liberal institutionalists prefer to highlight the importance of cooperation in international environmental regimes[39] and to study the mechanics of reaching international agreements (Young, 2005; O'Neill, 2009; Vogler et al., 1996).

By focusing on the reconstruction of the calculus of a given actor in a regime, the mechanics of negotiations, and the form and function of regimes, these theories do not explore how international cooperation is moulded by the contribution of new information or ideas, or by international norms (Bernstein, 2000; O'Neill, 2009) and how regimes shape state identities and thus negotiating positions (Paterson, 2001; Vogler, 2003). New ideas and norms may change the way states calculate costs and benefits of different negotiating positions but they can also make states change their own perceptions of their interests and international roles (O'Neill, 2009).

The actors involved in international environmental negotiations (not only nation-states but also business and global civil society)[40] have thus 'knowledgeable behaviour' and 'transformative capacity' but they also differ in their capability to 'make a difference' as access to human and nonhuman resources is unequal (O'Neill et al., 2004).

Following this constructivist approach, environmental norms[41] and their life cycle (their origin, rise, and widespread acceptance) shape state's identities and interests, especially when norms are institutionalised - when they become 'collective' or part of the social structure (Jepperson et al., 1996; Onuf, 1997). The more institutionalised a norm becomes, the less it can be contested and the stronger it will be in (re)defining state interests (Bernstein, 2000)[42].

The environmental norm of 'cosmopolitanism', for instance, underpins much of the debates about the institutionalisation that deepens the sense of international community and growing homogeneity in world politics - see for instance Doyle and Chaturvedi's (2010) take on the 'global soul'[43] in climate change negotiations (see too Jabri, 2011 on cosmopolitan politics). On the other side, the norm of

[39] A regime is regarded as a social institution, rather than mere formal inter-governmental arrangements or, more precisely, as defined by Krasner (1983: 2), "sets of implicit or explicit principles, norms, rules, and decision-making procedures around which actors' expectations converge in a given area of international relations", such as the use of the global commons.
[40] For the new 'hybrid' systems of state and non-state actors engaging in rulemaking in transnational governance, see Lemos and Agrawal (2006) and Andonova et al. (2009).
[41] Ogley (1996: 155) defines global environmental norms as "changes made and constraints accepted in the behaviour, habits and practices of human actors – states, firms, individuals and others – as a result of beliefs as to the disadvantages that would otherwise follow for the (global) environment".
[42] Bernstein (2000) proposes a 'socio-evolutionary' narrative explaining how norms are adopted and evolve as they interact with the social structure they encounter.
[43] Refers to the deterritorialisation that makes all peoples (North and South) citizen-consumers of the world in need of a global soul with which to confront the global threats of climate change.

'communitarianism' regards nations' individualism and self-interest amidst common destruction (e.g. when environmental issues are mostly dealt with existing national security agendas, see 2.6 above). This tension between citizenship and national sovereignty versus belonging to humankind within the biosphere remain crucial in the discussion of global environmental change (Dyer, 1996).

This is the case of the climate change regime (the 1992 United Nations Framework Convention on Climate Change – UNFCCC), the international stage where nation-states negotiate impositions on their right to pollute in order to avoid 'dangerous' climate change, but also bargain financial and technical assistance to deal with this global problem. Here, "any direction things may take is fully and unequivocally underpinned, guided by and embedded with normative concerns" (Goodman and Boyd, 2011: 3), with the major legitimising role of science in a postpolitical world (see section 2.3) of environmental politics (Swyngedouw, 2010).

Created to regulate the atmosphere as a global common sink of GHG, the UNFCCC has affected nation-states by shaping most domestic climate change policies across the world but after two decades it has yet to achieve its main goal of emission reduction[44]. Very complex negotiations involve nation-states with different priorities, reflecting specific historical structural situations, and hence different approaches to the issue of climate change[45]. The main issue is indeed related to the primary cause of climate change - the continuing dependence on fossil fuels for the energy needed to attain and sustain modern life styles (Soroos, 2005), making this environmental regime much more difficult to enact than other regimes, such as the Montreal Protocol on ozone (Litfin, 1994).

Climate change is thus, above all, a problem of consumption and lifestyles. It is not surprising that calls for acting locally and individually have gained prominence in the fight against climate change. While Spaargaren and Van Vliet (2000), for instance, have proposed to enlarge the scope of ecological modernisation to the domestic sphere, bringing environmental innovations to consumers, Dauvergne (2010) is more sceptical about the significance of greening consumerism and modern

[44] International cooperation under the UNFCCC is directed towards a common reduction of GHG emissions and preservation of GHG sinks to avoid a 'Hardin-like' tragedy of dangerous climate change (Vogler, 2000). UNFCCC's Article 2 states that the objective of the UNFCCC is the stabilisation of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

[45] It should be noted that, apart from the North/South divide (or wealth-poverty division), countries also have different levels of dependence on fossil fuels, and different levels of vulnerability to climate change, which adds more complexity to the UNFCCC negotiations, where specific interests of coalitions range from the oil-producing states, through the alliance of small island states (Vogler, 2000; Paterson, 2001).

lifestyles, while sustaining economic growth, thus mirroring much of the criticism regarding the concept of sustainable development (see 2.3 above).

Critical scholars' scepticism about a consumption focus emphasises the socio-economic or political structures and processes that generate global patterns of environmental degradation – arguing that there is a danger of depoliticising the global commons and neglecting the political struggles behind the creation and operation of institutions (Paterson, 2001; Vogler, 2005).

Bernstein (2000) identifies an international environmental norm of 'neoliberal environmentalism' affecting the climate change regime - the result of the intersection of environmental and liberal economic norms in the last decades (and institutionalised in the 1992 UNCED in Rio). According to this author, this norm is well established in most nations' portfolio of measures to tackle environmental problems: acceptance of the liberalisation of trade and finance as consistent with international environmental protection, and the promotion of market and other economic mechanisms over 'command-and-control' methods as the favoured method of management (Büscher et al., 2014).

The climate change regime is therefore mostly framed in an economic cost-benefit analysis, rather than in moral terms, reducing the scope for policy intervention by states (Oels, 2005). 'Climate commodification' (see 2.2 above for more on the commodification of nature), while not changing the *status quo* of increased technological development and growing consumption patterns (Conca, 2000), fosters what Bumpus and Man (2008) have called 'accumulation by decarbonisation'. This means that carbon offsets in the end represent a strategy of capital accumulation that transfers governance over the climate to supranational and non-state actors and to the market (see too Lohmann, 2014). Nation-states' *marge de manoeuvre* is reduced, with 'hybrid' structures of governance making the distinction between public and private ever more difficult (Andonova and Mitchell, 2010), and with competing negotiating agendas supported by alliances of business, environmental groups and state actors (Bumpus and Man, 2008). Moreover, the individual incentives typical of market-based mechanisms could undermine social goals, deepen unequal access to resources, and jeopardise accountability (Lemos and Agrawal, 2006).

Carbon trading became a new arena for capital investment and speculation, which, Liverman (2009) argues, has a questionable value in the developing world. Lohmann (2006: 219) has called carbon offsets "the fossil economy's new arena of conflict" and has shown examples (from Guatemala, Costa

Rica, Uganda, South Africa and Brazil) of "how projects designed to 'compensate' for continued fossil fuel use are helping to dispossess ordinary people of their land, water, air – and futures". By generating credits in the carbon market, these 'carbon-saving' projects contribute to the perpetuation of the 'old' impacts of coal, oil and gas production and use; they also deepen inequalities regarding land and resource access and ownership, thus culminating in a novel way of 'carbon colonialism' (Brown and Adger, 2004; Backstrand and Lovbrand, 2006).

In order for carbon markets to work, quantification is needed. A techno-scientific view of global carbon regulation thus portrays forests as reservoirs of carbon, notably based on narratives created by experts that focus on 'scientifically credible measurement techniques' and 'verification schemes' (see 2.3 above). This notion that "standardised carbon units can be produced through standardised sequestration projects in standardised developing countries" (Fogel, 2004: 111) is subject to criticism. While it is hard to trace let alone quantify, carbon can be considered a 'surreal commodity' (Liverman, 2009) and the science behind carbon quantification is not only contentious but also embedded in diverse political, economic and cultural contexts (Goodman and Boyd, 2011; see too Lohman, 2014). Carbon, elusive as it appears to be, now seems to have a 'social life' underpinning the current 'carbon-ification' of different social and environmental politics (Goodman and Boyd, 2011).

Mirroring the controversies regarding carbon measurement in forests (e.g. for the purpose of REDD+ projects), the use of biofuels as GHG emission mitigation inescapably underscores competing narratives about carbon offsetting, compared to other land uses (McMichael, 2010). Biofuel crop expansion in the global South would also be another facet of the deepening of the 'metabolic rift', and 'accumulation by dispossession' (see section 2.2), as well as of 'carbon colonialism' (McMichael, 2010). Certainly, biofuel crop promotion as GHG mitigation tool can lead to deep implications for those in the South, who will be the most affected by climate change and who have contributed relatively little to the accumulation of GHG in the atmosphere leading to the change of global climate.

There is a development imperative for those 'who were left behind' (Giddens, 2011) - the bottom billion, as Collier (2007) has put it. This is reflected in the underlying allocative principle of the UNFCCC for the burden of mitigation, which is expressed in terms of 'common but differentiated responsibilities and capabilities'[46] that has left developing countries out of the efforts of emission

[46] Formalised in Article 3(1) of the UNFCCC.

reduction in the Kyoto Protocol. This has been a major guideline framing Brazil's and other Southern countries' historical stances in the UNFCCC negotiations.

Southern critical views of global environmental policy are generally framed within postcolonial critique (see 2.3 above) which highlights the persistence of colonial forms of power in contemporary world politics. These include inequality on a global scale and the persistent domination of subaltern peoples. The concern of the North with climate change could be seen as an example of environmental neo-colonialism, as it is a problem mainly provoked by the limitless burning of fossil fuels in the North, now creating pressures on developing countries to leave energy-intensive development, side-lining issues of greater urgency in the South, such as the alleviation of poverty (Young, 2008). Furthermore, as the environmental agenda remains largely North-driven (Najam, 2005), the pursuit of environmental governance could give rise to or intensify environmental neo-colonialism (Young 2008; see too McMichael, 2009).

As a coalition in the climate negotiations (the G77 group), developing countries show the continued existence of common interests (the development priorities of the South, the responsibility for environmental degradation, a fair allocation of shares to global resources, and financial and technical assistance for the South), and attempt to form a joint bargaining position, albeit with deep divisions often thereby revealed. For some authors the 'Third World' has shrunk (Collier, 2007), as some emerging countries improve their economic status, and are affected by both globalisation and geopolitical shifts since the end of Cold War. The concept of 'Third World' or 'the South' is (and always was), in fact, an elusive one. It is not a homogeneous entity and has a debatable meaning - recognising 'a South' mainly means that North/South material, institutional and ideational divisions continue to shape the creation and development of global environmental regimes (Williams, 2005). Individual developing countries (in particular the larger and more powerful ones like Brazil) pursue their specific national interests in the UNFCCC, either within the group G77 or separately (Najam, 2005).

A distinguishing 'trilateral' world shaped by the growing role of emerging economies in the global economy showcases a variety of perceptions on globalisation and capitalism (Cooper et al., 2007). This new role of the emerging countries, which are not among the 'bottom billion' but still have not achieved the same *per capita* affluence as the North have complicated North/South disputes in the

UNFCCC, which in turn have stalled agreements and polarised stances. Some Southern economies are blamed not only for a growing proportion of global emissions but would also be "already competing with and undercutting developed world manufacturing industries" (Vogler, 2000: 138), and without substantial restraint on their part, climate change would not be successfully tackled (Soroos, 2005).

An oversimplified North/South environmental dichotomy, thus, cannot be endlessly used to frame the climate change negotiations, as the new environmental inequalities no longer follow established patterns of economic and political inequalities (Mol and Spaargaren, 2000). To add more controversy, it could be even argued that the increased role of the more powerful developing states in the global economy continues the previously identified patterns of 'Northern-led' development, reinforcing the destructive trends of resource exploitation (Dauvergne and Neville, 2009).

Furthermore, an oversimplified North/South environmental dichotomy may lead to some states mounting nationalist resistance against 'the West', without, for instance, consolidating intellectual property rights for bio-resources or protecting their farmers and indigenous communities' interests (e.g. Philip, 2001; Zhouri 2010). In fact, the nationalist quarrel against international capitalism, while privileging local entrepreneurial needs, often collides with the rights of the local peasantry and indigenous communities, who are often forgotten in this nationalist anti-global rhetoric. Here, again, comes the argument of the importance of Southern elites (Hecht and Cockburn, 1989; Arnauld de Sartre and Taravella, 2009; Guimarães and Bezerra, 2011), controlling and benefiting from global capitalism in the South - what Mies and Shiva (1993: 231) call a conflict "between small farmers everywhere and multinationals".

In this respect, biofuel development in countries such as Brazil has given more impulse to this tendency. As associations of State with domestic and transnational corporations foster the expansion of industrialised commodity and biofuel crop monocultures, traditional population livelihoods and rights are negatively affected (see Dauvergne and Neville, 2010 and McMichael, 2010).

Another drawback of North/South simplistic approaches to international environmental regimes lies in the diverse ways international environmental regimes are used by both Northern and Southern states to advance their interests. The role of soft power – "the ability to affect others to obtain the outcomes

one wants through attraction rather than coercion or payment" (Nye, 2008: 94) – is fundamental here, as it enables countries to have a better stature internationally.

There has been debate about the notion of soft power (e.g. Bilgin and Elis, 2008), but a useful starting point is to reject attempts at creating a category defined by objective characteristics, but instead to see soft power as a self-created identity or ideology, drawing on Keohane's (1969) notion of 'middle powers'. In this respect, the soft power of a country would primarily rest on three resources: culture, political values, and foreign policies (when these are considered legitimate and having moral authority) (Nye, 2008). 'Success' here can be seen as a great legitimiser (e.g. the US after the end of the Cold War), as well as participation in international negotiations such as the UNFCCC (Cooper, 2004).

Given this self-created identity, issues of a nation's credibility and reputation become 'national concerns', hence the development of propaganda and 'nation-branding' (see Anholt, 2010). This is "about the communication of information and ideas to foreign publics with a view to changing their attitudes towards the originating country or reinforcing existing beliefs" (Melissen, 2005: 19). Hence, there are here conscious, deliberate attempts at creating soft power.

While identity creation and image-projection/nation-branding are not new - a notion of competitive identity was already present in Rudolf Kjellén's writings (Marklund, 2015; see section 2.4)[47] - its current use deserves further scholarly exploration, namely via the self-promotion of 'green states' in international environmental politics, such as the case of Brazil. This is a further facet of the complex and evolving North/South dispute, as 'middle' or 'emerging' countries play their soft power tools, sometimes leading the way and representing the South, but often too creating divergences inside the South (Hochstetler, 2012). North/South disputes are hence not only about tangibles but also underlying meanings, evolving priorities and strategies, representations and conflicting understandings, stressing the need for more constructivist but also more critical, poststructural approaches.

[47] Furthermore, it occurred under Louis XIV in France (see Olins, 2002), and was also prominent during the Ataturk regime in Turkey (1923 to 1938) or the communist and fascist nation-building during the 20th century (Melissen, 2005).

2.8 Summary

Chapter 2 established the theoretical framework of this PhD. That framework underpins three key areas, with different scales of analysis. Thus, a political ecology approach to biofuel policy and production chains seeks to understand causal relations between biofuel and deforestation control policies. Biofuel practices and their environmental consequences are herein conceived at multiple scales and across different actors and studied in their specific, political and economic contexts so as to understand how local practices are influenced by economic factors and by neoliberal practices of environmentalism. The political ecology concern with power relations and access to resources allows for a better understanding of land-use-related environmental problems especially those concerned with scarcity, social conflicts and conflicts over land-use. Furthermore, the poststructuralist emphasis of political ecology on discourses, knowledge and power allows for a better understanding of environmental narratives and political discourses sustaining deforestation control and biofuel measures, and that reveal unequal power relations and a politicised role for science here too.

Secondly, and drawing on this focus on discourses, knowledge and power, a critical geopolitics approach will help understand the territorial dynamics surrounding the interaction between biofuel and deforestation control policies, by exploring the discursive and material geopolitical practices in which the Brazilian state and non-state actors interact over issues related to land-use and biofuel production. Conflicting practices of land-use and questions of scarcity and land tenure as drivers of socio-environmental struggle are herein framed in the context of global environmental (and energy) security risks underpinning an extra pressure on the Brazilian nation-state's territorial practices and geopolitical rationales.

Finally, selected international relations theories further situate Brazilian efforts to promote biofuels and address deforestation control issues in the context of changeable international relations. At the international level, policy articulation and priority setting regarding land-use, the promotion of biofuels, and tackling climate change underpin contradictions, potentially leading to conflicting priorities at the domestic level. Furthermore, in addition to the unequal social and environmental impacts of climate change, the international regime created to tackle it - and its market-oriented philosophy - can potentially, and unequally, affect nation-states, local communities and ecosystems. Having

established the theoretical framework of the thesis, the PhD now turns to a consideration of its chosen methodology.

Chapter 3. **The methods of study**

Drawing on the theoretical elements described in the previous chapter, I undertook an investigation into the core concern of this thesis regarding the connections between biofuel and deforestation control policies in Brazil. I investigated the material and discursive dynamics shaping these connections at different levels and encompassing the diversity of actors that intervene in such policies. In order to accomplish this, two case studies were carried out in the state of Mato Grosso: one on biodiesel and another on ethanol production pathways.

Here, the concern is to discuss the methods used in my research. Thus, the chapter begins with an explanation of the epistemological assumptions underpinning the study and provides a justification for the particular qualitative and case study approach that was chosen. It goes on to explain why Mato Grosso state was chosen as the location for the case studies. There then follows a description of the specific techniques that were utilised, the reasons for employing individual procedures, and an outline of ethical considerations. The research design and schema are next outlined. Finally, this chapter identifies the practical issues related to the research in the field, even as it evaluates the practical solutions that were taken.

3.1 Qualitative research and a case study approach

Decisions about research design, methods used and research themes reflect the author's philosophical assumptions concerning ontology and epistemology. By accepting that a material world exists independently of human perception but recognising at the same time that my knowledge of that world is necessarly situated and contingent, I have adopted a philosophical approach known as 'critical realism' (Bhaskar, 1975; Sayer, 2000). Human knowledge is here a mere representation of reality (Braun, 1997; Castree and Braun, 1998) – of both the 'social' and 'natural' worlds – so it cannot be limited only to what is empirically observable; likewise, causation cannot be defined by how many times something is empirically observed. Critical realism thus provides a 'third way' between empiricism and positivism[48] on the one hand, and extreme relativism on the other (Sayer, 2000), thus being able to grasp the particularities of both the human and non-human world, whose interaction is key in political ecology, the main theoretical framing of this PhD.

[48] Positivism considers reality independent and external to the researcher and encourages the use of the methods of natural sciences to produce knowledge about it, notably through hypothesis-making and testing. The overall aim is to determine laws that can be applied universally (Bryman, 2008).

Thus, this research is notably concerned with interpretation in order to grasp the subjective meaning of social realities. This means that the perspectives of both the researcher[49] and the participants are crucial in producing knowledge about the 'reality' being studied, and relates to the general trend in human geography of a search for meaning rather than scientific explanation (Geertz, 1973; 2000; Anderson, 2015). Clashing representations of the same reality by different actors are a key element for understanding the biofuel-deforestation political dynamic, as investigated principally in Chapter 8.

At the same time, attention to both action and practice (what people do) – for example, cutting trees to plant soybean or voting a bill in the National Congress – is also critical to this research. These issues of human agency should, in turn, be framed within the overall debate in human geography about agency and structure, underpinning two different ways of conceptualising the role of individuals in social relations. On the one hand, there is a structuralist side which sees capitalism as a functioning system with its own internal logic reducing individuals to mere passive agents in the production and reproduction of that system; on the other hand, a more humanist side, proposes that people are capable of being creative, destructive, or reflective.

An intermediary approach provided by Giddens (1984) is the theory of structuration, recognising that the relationship between individual agency and structure is reciprocal. This means that human agents are active elements defining the outcome of social interactions, being at the same time embedded in a specific social context. Structures, thus, through various institutional arrangements, both constrain and enable human action. Human agents, in turn, through their behaviour, participate in the institutional arrangements that influence their behaviour and may change those structures (Graham, 2005). This is of particular importance for the understanding of land-use dynamics and how farmers make their land-use choices, as explored in Chapter 7.

The material aspects of human-environment relationships are central to this research, in particular the land-use dynamics of biofuel crop production. Critical realism enables the integration of "biophysically grounded explanations of environmental change with political analysis of the social framings of science", thus avoiding the adoption of pre-conceived notions of ecological causality and meaning (Forsyth, 2003: 16). In fact, one of the key issues in the politics of biofuel and deforestation control is competing narratives about land-use impacts of biofuels (see Chapter 6) and how these are

[49] Issues of positionality to be dealt with later in this chapter.

predicated on science and disseminated by various state and non-state actors. It is therefore necessary to understand that environmental explanations arise in certain political contexts and can have a significant role in shaping struggles over the environment (Robbins, 2004).

These epistemological assumptions, combined with the specific nature of the research questions have influenced the choice of methods in this thesis. A critical realism epistemology is generally conceived, but not exclusively, with qualitative research methods[50], making it possible to go beyond surface impressions (Harvey, 1990). It is a common approach in human geography (Hoggart et al., 2002), seen as having a high explanatory potential for complex social and natural dynamics (Iosifides, 2011) such as the ones being investigated in this thesis.

Indeed, the study of any decision-making process, herein a biofuel policy and production pathway and deforestation control governance, inevitably requires an analysis of unquantifiable social relations. Qualitative methods - which include, among others, unstructured and semi-structured interviews, participant and direct observation, and documentation – can be used alone or combined to grasp the intricate, varied features of complex social interactions that frame the decision-making process.

One of the main advantages of deploying qualitative methods is that it allows the researcher to “see through the eyes of the people being studied” (Bryman, 2008: 385) which is a precondition for the study of people and their social world (Lofland and Lofland, 1995). This can be helpful for attributing meaning to events and the context in which they occur.

Seeing through the eyes of the people being studied prevents imposing a predetermined format on the societal components of the study, thus avoiding prior intellectual 'contamination'. This approach helps to bring to light the perspective of the people under study and to uncover aspects of their social world that could not have been anticipated by the researcher. As a result, qualitative researchers do not overly delimit areas of enquiry and tend to ask fairly general rather than specific questions (Bryman, 2008). It also gives the researcher a certain degree of flexibility to change direction in the course of the investigation, as new issues or themes emerge.

[50] A ‘qualitative research’ is generally referred to in opposition to quantitative methods, as an umbrella for different methods that do not fall under the quantitative label and is commonly perceived as being more inductive, epistemologically interpretativist, and ontologically constructionist.

Other features of qualitative research include the provision of in-depth descriptions of places and phenomena and an emphasis on the context in which social interactions occur. This favours the creation of a rich data set, situated within a 'real-world' context. The main purpose of description is not to describe for the sake of it, but rather is to build explanation with it. Descriptive detail provides an account of the context within which human behaviours occur, being crucial to understand those behaviours (Bryman, 2008). Bearing this in mind, Geertz (1973) suggested the provision of 'thick descriptions' of social settings. These were crucial for the understanding of the biofuel land-use dynamics (Chapter 7) and deforestation control political dynamics (Chapter 8) investigated in this thesis[51].

Given the interest of this thesis in intensive and in-depth descriptions of the contemporary social phenomenon that shape biofuel policy, as well as deforestation control governance, the research design is centred on an intensive, case study approach, as described by Yin (2009). It focuses on a limited number of sites rather than undertaking a large-scale survey approach of multiple research locations. This focus on depth rather than breadth means that the case study research is here more concerned with the complexity and particularities of a given case than more general patterns that emerge across a larger number of cases (Stake, 1995).

Case studies can also provide for the above-mentioned degree of flexibility and give access to the experiences of multiple actors, within their 'real-life' context (Yin, 2009). In this thesis I was interested in the relations between the various social groups which contributed to the biofuel and deforestation control policy dynamics (and the impact this had on the environment). A crucial task of the fieldwork was to map the political interactions involved in such dynamics. In such a way, I was able to identify the main social actors as well as their interests and claims (e.g. on land-use and territory) and political articulations, thereby detecting clashing discourses and the differing cultural and political legitimacy bases (Little, 2006).

Hence, and given the breath of actors involved in my chosen topic, I did not focus on the livelihood of a particular social group (e.g. farmers) but on the socio-environmental conflicts and multiple social and natural interactions that underpin them. Such an approach inevitably reduced the depth of the

[51] For understanding the importance of context when studying Brazilian biofuels, see Mabee (2007) and Sparovek et al. (2007).

analysis of each social group but the overall aim was not descriptive ethnography *per se* but rather the study of relations between actors (Little, 2006).

This resonates well with the political ecology approach explained in Chapter 2 – in order to achieve a more comprehensive analysis of society-environment issues, the researcher needs to acknowledge the multiple actors involved at different scales and the associated material and discursive dynamics. Notwithstanding this multi-actor and multi-scale approach, the case studies need to be grounded and their unit of analysis clearly defined, in order to separate the phenomena that are going to be analysed from the overall context (Yin, 2009).

I selected two case studies, one illustrating biodiesel production from soybeans and another bio-ethanol production from sugar cane. These examples served as an illustration of the broader Mato Grosso biofuel sector, and allowed a comparison to be made of two different kinds of biofuels, corresponding to distinct agricultural (and hence, land-use) dynamics. Both case studies were 'grounded' on the farmers who produce biofuel crops – a cooperative of family farmers producing soybeans under the 'social stamp' mechanism and an ethanol distillery whose associates own or rent sugar cane plantations in its environs. This made it possible to trace biofuel production back to the respective land-use practices.

From this study basis, key actors interacting at various levels in the chain of production emerged. This means that the geographical scope of the thesis has not been limited to that only of local farmers, but it has incorporated various levels of social articulation. The corresponding scalar dynamics, as seen in Chapter 2, is important to gauge, as it may be a source of power for certain actors to promote their interests at the expense of others (Little, 2006).

Adopting a case study approach inevitably entails questions of generalisation. The use of case studies is perceived as leading to an inability to generalise, whereas in more 'scientific' methods a large sample size is seen to enable generalised 'truth'. By adopting a case study approach, I did not attempt to make a survey of all or over many biofuel producing regions, but rather I wanted to discover how and why biofuel and deforestation control policies connect in a given context. The crucial question was not whether the findings could be generalised but how theory could be generated out of the findings (Mitchell, 1983), through an inductive process of analytical, rather than statistical generalisation.

Questions concerning the quality of research are particularly relevant when conducting case study investigations. In fact, and as Bryman (2008) argues, the quest for validity and reliability should be central to case studies just as with other research approaches.

Firstly, validity means that “representation of a concept is valid to the extent it accurately reflects the concept it is purported to characterise” (Hoggart et al., 2002: 58). In order to construct validity, Yin (2009) proposes using multiple sources of data and various techniques of data collection to provide different measures of the same phenomenon. This use of complementary methods is called ‘triangulation’ (Hoggart et al., 2002: 67) and enables the creation of a more, 'truthful' set of evidence (Yin, 2009). In this research, data was triangulated across types of method (for instance, interviews were crosschecked with documents) and according to different actors (for example, what state officials say was crosschecked with NGO or other civil society activist or researchers – and vice versa).

Another issue concerning case studies is the problem of reliability - the degree to which data is free from errors and biases. Ensuring reliability means that a different investigator is able to repeat the exact methods and procedures later, and arrive at the same findings, irrespective of time or place (Yin, 2009: 45). However, it is almost impossible to have absolute replication of data in social research since society is subject to change that makes for uncertainty over the repeatability of social events (Toffler, 1970). Hence, and as Plummer (1983) has argued, validity should be the priority in qualitative research, rather than reliability. Nevertheless, I used a case study protocol and developed a case study database to improve the reliability of my research (Yin, 2009). Maintaining an up-to-date field research diary, where the time, location and observations of each interview were recorded also contributed to the reliability of the study. Finally, the use of voice recordings – not used when interviewees refused permission or appeared uncomfortable in its presence - provided a more accurate rendition of interviews (Yin, 2009).

3.2 The Choice of Mato Grosso

In Chapter 1, I explained my reasons for choosing Brazil as the focus country. I decided to base my case studies in the centre-west region of Brazil in the state of Mato Grosso. Since this state contributes significantly to national agricultural production, being the main national producer of

soybeans, it consequently embodies the current trends within Brazilian agriculture and was therefore an optimum location for providing relevant data for my study.

In fact, a modernised, industrialised, and internationalised agriculture has given rise to significant economic growth in this state and to the rapid development of its cities. Colonised from the second half of the 20th century the state also illustrates how 21st century Brazil is still undergoing a 'frontier' clash as a result of further occupation as well as the modernisation of 'empty' land which has had social and environmental consequences. These include, for instance, land-use-related GHG emissions and conflicts over land, and/or with indigenous peoples (see Chapter 4).

It is in this setting that the biofuel industry has been established, namely biodiesel from soybeans and ethanol from sugar cane. I considered Mato Grosso the ideal location for carrying out my research for a number of reasons. Firstly, the state lies within the Legal Amazon, and therefore deforestation control policies have major significance for its agricultural practices and in particular, biofuel crop production. Environmental legislation has in turn sparked resistance, largely in the form of territorial counter-strategies by the agribusiness lobby. Secondly, despite the existence of protective legislation, Mato Grosso has an unenviable reputation, within Brazil as well as internationally, for its high rates of deforestation. Thirdly, biofuel crop production (soybean and sugar cane) is part of the on-going expansion of the agricultural frontier that progresses in Mato Grosso from the Cerrado biome north and west-wards towards the Amazon biome. These factors together have made Mato Grosso a crucible for understanding Brazil's biofuel/deforestation policy connections, contradictions and associated discursive political struggles. Lastly, research on the social and environmental effects of biofuel development has rarely focused on Mato Grosso, underpinning an under-researched area that needs more careful attention[52].

3.3 Research techniques and ethics

3.3.1 Documentation

During the initial research stage, I sifted through a large number of documents held in different media types, extracting the most relevant for the purpose of the thesis. As one step in the research, the analysis of documents notably guided the construction of the case studies by giving information on

[52] This might be the consequence of Mato Grosso being distant from the main ethanol producing and exporting region (São Paulo) and from the Northeast region where the biodiesel programme (PNPB) was supposed to have a greater role.

the biofuel chains and hence thereby contributing to the choice of locales for fieldwork description. My initial research included an examination of a wide range of documents on biofuel and deforestation control policies in Brazil that helped me to gain an understanding of the various actors involved in my area of study and their related standpoints. Other documents of interest include diplomatic texts (e.g. bilateral promotion of biofuels), and scientific reports. Official documents issued by state agencies and the private sector were the main focus of the analysis, and civil society reports were also featured. Speeches by key actors were a fundamental resource for ascertaining the politics of biofuel and deforestation control (e.g. former President Lula da Silva, former Environment Minister Marina Silva, President Dilma Rousseff, Agriculture Minister Kátia Abreu, Environment Minister Izabella Teixeira, or the late Congressman Homero Pereira). Furthermore, media articles (e.g. international, Brazil-wide and regional-scope newspaper articles) provided relevant information on specific issues as well as additional context while institutional websites provided key information on actors and policies.

The research has included visual imagery (photography, videos, or promotional materials) to serve as an illustration of the findings or as data in their own right (Bryman 2008). These included available visual imagery, as well as photographs by the researcher as part of his fieldwork observations.

Documentary evidence is helpful for providing information that would normally be beyond what is physically possible for a researcher to achieve in the relatively short period of time of the field research (Yin, 2009). Media articles and websites, for instance, helped provide longer time span-information, crucial for the understanding of the context of case studies and the evolution of the policies being studied.

And yet, the use of documents inevitably raises some concerns. Firstly, documents have a distinct ontological status conferred by the purpose behind their creation, so they cannot be taken to be 'transparent representations' of a social reality (Atkinson and Coffey (2004). And indeed in this thesis the objectives behind particular documents were of crucial importance, for instance for understanding the rhetoric of Brazilian diplomacy in the UNFCCC. Secondly, and concerning the quality of the documents analysed in this thesis, I paid attention to issues of credibility (determining whether documents were free from error or distortion) – while recognising that the biased views of the document's authors were also interesting points in and of themselves (Abraham, 1994).

Other concerns with this technique regard issues of access to and the ability to retrieve documents. This became a problem during the fieldwork as some information was deliberately withheld, notably GIS information on farmers' holdings. In fact, I did not have access to GIS data that would allow me to categorically confirm statements made by farmers regarding their land-use practices, in both case studies (in Case Study 1 the GIS database in the municipality kept farmers identity concealed; while access to such kind of information in Case Study 2 was denied by the distillery administration – the experience is described in Chapter 8). I therefore had to rely on the testimonies of the farmers themselves regarding their land-use trajectories. However, this did not undermine the main purpose of the research, which was concerned to explore political dynamics rather than developing land-use models or proving that farmers had illegally deforested.

3.3.2 Semi-structured interviews

The purpose of undertaking semi-structured interviews was to obtain primary data by recording at first-hand the opinions and discourses of various actors and to identify practices related to biofuel production and deforestation control. Furthermore, the semi-structured interviews were important for contributing to the cross-verification of data: inter-actor triangulation and triangulation with data issued from the other techniques.

Semi-structured interviewing as a technique can reveal perceived causal inferences and explanations (Yin, 2009). This method was invaluable for recording and analysing the personal experiences of those I interviewed as well as for gaining an insight into the significance which the interviewees themselves attached to their own experiences (Flowerdew and Martin, 1997).

Choosing semi-structured, rather than structured, interviewing provided me with the above-mentioned flexibility. Furthermore, the inclusion of open-ended questions made it possible to obtain more spontaneity and richness in respondent answers. The interviews were thus guided conversations with the stream of questions more fluid rather than rigid (Rubin and Rubin, 1995). The interviews were focused on this thesis subject, allowing me to exercise a degree of control of the situation and thereby achieve a relative standardisation among interviewees in terms of topics covered, even if the interview structure was adapted to the different kinds of actors (see Appendix A).

Given that some actors were not willing to concede much time for an interview, for instance, busy state officials or industry representatives, I structured them in such a way so that the impact on the

interviewees was reduced. Interviews were thus of the focused type (Merton et al., 1990) - held for a short period of time in a conversational manner allowing key information to be obtained while respecting the time constraints of the interviewee.

The possibility of bias from memory lapses and distortions is, however, a major disadvantage of this technique, as well as reflexivity (the interviewee gives what the interviewer wants to hear), a factor which I anticipated would be counterbalanced by applying triangulation techniques, as noted above.

The qualitative nature of this thesis does not entail a probability sampling logic - the aim was not to achieve generability but case-study specific evidence. Convenience sampling of the purposive kind - whereby sampling is done by selecting the people who are relevant to the research topic - was applied to help identify the interviewees. This research undertook purposive sampling of two kinds: 'snowball' (used when there is no sampling frame); and 'theoretical sampling' (an iterative strategy whereby interviewees are sampled until categories achieve theoretical saturation) (Bryman, 2008).

Documentation and interviews carried out in the initial phase helped to identify key actors who would be important to interview in a later phase in order to achieve an appropriate array of interests. I ultimately succeeded in interviewing 80 people.

Interviews were held in Portuguese, the official language of Brazil and the native language of the researcher. To avoid communication problems, when approaching less formally-educated people, a more simple, popular tone was adopted. Furthermore, interviews were conducted at a slow pace so as to facilitate comprehension and to minimise any difficulties in understanding the delivery of the researcher's European Portuguese, notwithstanding his adaptation to the Brazilian accent. Interviews were recorded with the use of a tape-recorder, where interviewees gave prior consent (only three declined), thus contributing to the reliability of the study by providing a more accurate rendition of interviews. Following transcription, translation into English was carried out in such a way so as to respect sentence structure and the original 'voice' of the interviewee - even where Latin language structure is not best suited to standard English translation – so as to avoid losing nuance and meaning.

I was aware that interviewees could be more circumspect when being taped, and tried to maintain a conversational tone and to build a relationship of trust whenever possible. A particular concern of

farmers in Case Study 1 was being interviewed at the headquarters of Coopertã. In order to encourage farmers to provide a genuinely personal response to the questions, free from any perceived pressure on their part from the presence of the Coopertã President and engineer, it was important to conduct the interviews privately in a separate room.

3.3.3 Direct observation

To complement the techniques of documentation and semi-structured interviews, observation of events (e.g. meetings) or places (e.g. biofuel industrial units) was undertaken by the researcher. Observation of behaviours and associated environmental conditions served as another valuable source of evidence as it helped me to understand the context of biofuel production. The case study approach of this research gained from having observation included in the mix of methods - in this case direct observation, which interacts less with the people being studied, has its focus limited to this thesis theme, and is carried out over a much shorter period of time than ethnographical research.

Direct observation can help assess the occurrence of a given behaviour or the characteristics of a given environment during certain periods of time in the field. On occasions, direct observation was employed immediately before or after a semi-structured interview, or during a field visit, when something of relevance came up (Yin, 2009). For instance, I noted down not only how interviews were conducted but also described premises where they took place, from ministries to farmers' holdings.

In Case Study 1, I undertook observation of farmers' holdings at different times of the year, including the two harvest periods, soybean followed by corn. In Case Study 2, observation encompassed cane plantations where mechanised and manual harvest methods were employed. Regarding industrial units, I visited Barralcool's administrative sector (access was not granted to the industrial unit), Grupal in Sorriso (administrative sector) and Cooperbio in Cuiabá (where access *was* granted to the industrial unit). Additionally, observation techniques were employed when visiting the cooperative, unions and NGO offices, government premises (federal, state and municipal including congressmen offices, ministries, municipal administration offices); areas of special interest, such as the *Assentamento* Cedro Rosa in Case Study 1 and the Umutina indigenous land in Case Study 2; the cities where case studies were located; and while driving along the BR163 and MT142 roads. I was fortunate to have been invited to stay with a farming family while carrying out the field work in Case

Study 1 and similarly, in Case Study 2, I was able to stay with a friend of a farmer, which gave me an insight into daily family life and the broader social dynamics of these actors.

It was also important for me to be aware of the limitations of direct observation. For instance, it cannot help reconstruct events, hence inevitably lacks historical depth and my research indeed was a snapshot of 2012. Furthermore, the effects of the observer upon the people being observed pose a problem of reflexivity, as events may proceed differently precisely because they are being observed, even if direct observation does not entail as much interference as participant observation (Yin, 2009). While this may have happened when I visited industrial premises, or governmental offices, during most of the observations (e.g. PSD party convention, the opening of Embrapa Sinop, or the Rio+20 events) my presence was not noticed in the crowd.

Direct observation was helpful in complementing and adding another dimension to the interviewing process. In fact, this method was invaluable for providing a first-hand account of events relating to the development of biofuels and deforestation control and illuminated how actors behave in such settings, and contribute to the triangulation of data (Bryman, 2008). And indeed it helped encounter unexpected facts or enabled interviews otherwise not possible.

During the events I attended – some anticipated as with the Rio+20 summit, others unforeseen when I planned the fieldwork (e.g. the PSD party convention in Sorriso; the opening of an Embrapa unit in Sinop; or a public hearing in Case Study 1's Nova Ubiratã) - still presented an opportunity to record speeches by key, high-rank actors – most of whom I could have not otherwise succeeded in interviewing (e.g. Senator Blairo Maggi, Minister Izabella Teixeira, former Minsiter Marina Silva, or Congressman Homero Pereira). I was also able to approach other key actors at those events and request interviews (e.g. Brazil's climate change secretary).

3.3.4 Ethics

The research that is undertaken to investigate the context, processes and social constructions of biofuel and deforestation control polices necessarily involves a degree of human interaction, so it was important to be aware of the ethical considerations involved.

By observing a code of ethically correct behaviour in the conduct of this PhD, I tried to protect the rights of individuals, communities and environments involved in, or affected by, the research. Firstly, it

was important to inform the interviewees about the nature and conditions of the research. In order to seek their consent, participants were informed about the purpose of the study, the identity of the researcher, and the subsequent use of data (Gilbert, 2001; Hay, 2003; Cloke, 2004).

Many authors consider the respect of privacy as a fundamental requirement of ethically-informed work (Hammersley and Atkinson, 1995; Gilbert, 2001; Hoggart et al., 2002; Longhurst, 2003; Cloke, 2004). It also allows the researcher to establish better relations with interviewees and to encourage frank and honest answers as a result. In order to respect the privacy of participants in this thesis, confidentiality of data was guaranteed.

I ensured that all the fieldwork data was secured on a computer database with password only-access. Interviewees were allocated individual codes with numbers[53] - and they were informed from the outset of their right to withdraw from the research at any time (Longhurst, 2003). It is inevitable, however, that, notwithstanding the numerical coding, a few of the interviewees could, potentially, be identified by other people in their respective economic or political sector (e.g. there was only one 'President of Coopertã' when I conducted my fieldwork).

Confidentiality was especially important in the case of NGO activists (some had experienced death threats in Mato Grosso, see Chapter 8); as well as farmers, who opened up to me about their deforestation practices. This PhD thus avoided causing harm or other negative consequences to participants (Hammersley and Atkinson, 1995; Gilbert, 2001; Hay, 2003; Cloke, 2004). These concerns reflected the ethical approval process overseen by the Research Ethics Panel of King's College London, a process fully complied with before the field work began.

Finally, I understood the importance of being aware of the cultural and social context where the fieldwork took place. As a 'First World' researcher investigating 'Third World' subjects, I needed to be sensitive to local-specific codes of conduct, including rights, beliefs and cultural contexts of the participants, and their position in terms of power relations with different actors across different scales (Hammersley and Atkinson, 1995). As an important 'good' in its own right, this step also helped to assure a favourable climate for the conduct of the enquiry and for the maintaining of trust[54]. From that position of trust - achieved to a greater or lesser degree depending on the interviewee - I was able to

[53] An exception was the former Secretary of the Environment, José Goldemberg (Collor de Melo administration, which organised Rio92), who conceded to do an interview and provided details of his role in Brazilian environmental policy history, so his name is given.
[54] See for instance Walsh (1992) on ethical issues on Pacific island research.

undertake most of the research without causing suspicion or fear amongst those people being interviewed or observed (Hay, 2003). In order to accomplish this, I adapted my posture, discourse and clothing to the different kinds of actors being interviewed or environments being observed.

In order to adopt an honest and professional approach to the research, I was aware that I needed to be conscious of how my own perspective on the research topic could potentially influence the findings of the study. As someone who had been concerned beforehand about the impact of biofuel practices on the environment, which led to my choice of research topic, there would likely be times when my investigation would elicit a personal response. As a means of trying to combat my own biases (which in the end can never be fully eliminated), I intentionally adopted a 'neutral' and 'balanced' approach during interviews, without pre-conceived ideas regarding particular actors, thereby avoiding being seen to favour any side of the debate and by so doing I succeeded in gaining the approval and trust of the interviewees (Little, 2006).

This approach was particularly important when interviewing farmers. By presenting myself as a neutral researcher (and hence without an 'environmentalist agenda'), I emphasised that I was not there to judge them but to understand their perception of the policies under study, thus avoiding any anxiety arising over questions relating to deforestation. Living with farmers in Case Study 1, and with farmers' friends in Case Study 2, certainly contributed to building this trust relationship.

3.4 Research design and schema

In order to grasp the complexity of such a research endeavour, with numerous sources to be pursued for documentary evidence and a wide range of actors at numerous scales to interview, the research took place over 12 non-consecutive months in 2012 and early 2013 and was conceived in terms of four broad stages in the field: initial research in Brasília and São Paulo; research in Mato Grosso's capital and early investigation of possible case studies; in depth investigation at the case study localities; and preliminary analysis of results and supplementary interviews. Although these phases overlapped in reality, they provided me with a rough temporal structure for organising my fieldwork.

I began my research in earnest in February 2012, by examining documents at national level relating to biofuel development and deforestation control, and interviewing and familiarising myself with the key actors in São Paulo. During this stage I was based in São Paulo for academic and logistical

reasons, but also because key academic establishments (e.g. the USP and the FGV) and business (e.g. UNICA, Abiove and ICONE) of relevance to the study were concentrated there. I also undertook visits to the country's capital, Brasília, where I stayed for a total of three, non-consecutive, months. During this stage, the main task was to analyse biofuel and deforestation control policy documents, official reports and scientific studies, plus an assessment of relevant documents produced by diverse non-state groups including NGOs and industry bodies. This work resulted in a first mapping of the discourses on biofuel and deforestation control. During this stage I was able to design a network of actors for research from political actors at various levels, to academia, business representatives and NGOs. Snowball sampling following initial interviews with key informants (such as government officials) and 'gate-keepers', especially in Brasília, was a crucial step for discovering who were the most relevant actors for the study.

Of great help here was the Portuguese Embassy in Brasília, which provided support for contacting state and non-state actors in the federal capital. Key interviewees were contacted in the first instance by the Embassy and advised to expect an email from myself requesting an interview. The responses were quick and most of the interviews at this stage were set up in this way.

Without prior contact by the Portuguese Embassy, some interviews were harder to set up. In fact, the difficulty of making contact with political actors at the higher levels in Brasília became a significant issue that demanded some lateral thinking to resolve as they seldom answered my emails requesting an interview. In the case of the Lower House of the National Congress, I received only a handful of answers (almost all referring to other parliamentarians as they were not 'experts' in the issue). Most parliamentarians whom I contacted (members of the Environment, Agriculture and Energy committees) did not respond.

Fortunately, one Lower House member, indeed the only one who had responded positively to my email request for an interview was prepared to provide me with accreditation to enter the National Congress building. Once inside, I went directly to offices of Lower House members and requested an interview to their personal assistants (PAs). For the most part, the PAs were willing to try and slot in a meeting in their Members' diaries. However, in the majority of cases, the available time slots did not coincide with my stay in Brasília, while others that had been booked were later cancelled, and others

still promised interviews but failed to respond subsequently when I followed up the request. In the end, I was able to interview three parliamentarians: one from the Green party; one from PT who had contributed to legislative proposals regarding micro-distilleries of ethanol; and a member of the PP party and of the Biodiesel Front in the Federal Parliament.

As I had access to the National Congress (Lower House and Senate) premises, I took the opportunity to walk around on the look-out for anything that could be of significance during the voting on the new Forest Code. In this way, I witnessed negotiations and discussions taking place among parliamentarians in and outside the Plenary. I also succeeded in attending a public hearing on climate change in the Senate and hence learned what various Senators had to say on the topic, as I had no luck prior to this in booking interviews with them (only three answered: two claimed not to be 'experts' in the subject and one agreed to an appointment but subsequently cancelled).

Thanks to the preliminary approach of the Portuguese Embassy, I managed to interview two officials in the Ministry of Environment (MMA): one in the climate change secretary, the other, the Director of Deforestation Control (I later also interviewed the Climate Change Secretary of the MMA at the Rio+20 conference). Other officials were interviewed at the Ministry of Agriculture (MAPA), the Ministry of Mines and Energy (MME), the Itamaraty (Ministry of External Relations) and the Casa Civil (Brazil Chief of Staff), while the only unsuccessful approach was at the Strategic Issues Secretary (SAE) due to diary clashes. I also managed to interview two officials at the Brazilian Agricultural Research Agency (Embrapa) in Brasília: one was a senior official who had been involved in that agency since its setting up in the 1970s and had presided over it; and a younger official, a scientist of the Agro-fuels unit of Embrapa who was researching on different feedstock for biodiesel production. In Brasília I also had the chance to interview a representative of the agricultural lobby, the National Agriculture Confederation (CNA); and a scholar at the University of Brasília (UnB) who has been studying the role of Brazil in international environmental negotiations.

Some actors however did not concede interviews, in particular, UNICA (the São Paulo-based Brazilian Sugarcane Industry Association); CONTAG (National Confederation of the Workers in Agriculture); National Petrol Agency (ANP); and Petrobras. For instance, despite numerous attempts through

different means (e.g. referrals by scholars or direct emails) to contact UNICA, no one could 'find time' to meet with me[55].

The second stage of my research was undertaken in the state of Mato Grosso (see Figure 3.1). I went to Cuiabá, the capital of that state, and finally met up with my gatekeeper who I had previously contacted only by email[56]. She took me to her office at the Rural Development and Family Farming Secretary (Sedraf) where she introduced me to the Vice-secretary who I was able to interview. The secretary subsequently drove me to the north of Mato Grosso to attend an agriculture fair in Sorriso which was due to take place. Although I had not expected to be visiting northern Mato Grosso at such an early stage of the fieldwork, I made the most of the opportunity to make preliminary contacts in the region. I was also able to attend a PSD party convention which was being held there on the same day. Moreover he introduced me to the official of the Sedraf Consórcio in Sorriso who would later prove to be of invaluable help in Case Study 1.

The secretary also introduced me (by means of phone calls) to key actors in Cuiabá: the Mato Grosso Union of Ethanol Producers (Sindalcool), the Mato Grosso Federation of Farmers (Famato); and state parliamentarians (I managed to interview five). He also helped me to contact the President of Barralcool (Case Study 2).

My gate-keeper in the Sedraf in Cuiabá also provided an introduction to a Mato Grosso Federal University (UFMT) scholar from the Geography Department. This scholar then invited me to come to UFMT and give a presentation about my thesis to the masters students. It was a great opportunity to meet other scholars and get to know some of the research already done about Mato Grosso. The students themselves proved to be a helpful resource for my research, in various ways, by for example, suggesting readings pertinent to my study and proposing more contacts. One student presented me to his friends at the SEMA and, once there, I was able to interview the Environment Secretary of Mato Grosso, an official of the Planning Secretary (SEPLAN), a representative from the local environmental NGO, ICV, and two representatives from the Environmental Forum of Mato Grosso, Formad. In the end, from the array of actors I initially wanted to interview in Cuiabá, I was

[55] Nevertheless, in a subsequent phase I succeeded in interviewing the Sindalcool representative in Cuiabá, which was perhaps of greater relevance, given that the Mato Grosso sugar-ethanol industry is not represented by UNICA.
[56] A Brazilian friend in London introduced me to his cousin who knew her and introduced her to me via an on-line social network.

unsuccessful in contacting only two: the Federation of Rural Workers (Fetagri) and the State INCRA office.

A number of links and contacts suggested to me, however, turned out not to be helpful, so my time was often absorbed in an on-going process of exploring and evaluating various channels of inquiry and then, depending on the outcome, I would be able to add information to the thesis or have to change course and re-focus my investigations on other options. Nevertheless even where a number of routes of inquiry did not lead to interviews or provide primary data for the thesis, some contacts were unexpectedly helpful in framing specific contexts. An example of serendipity was in meeting a soybean harvest machine operator while staying in a hostel in Cuiabá. This working man habitually travelled around the state offering his labour to the managers of the large plantations. As a result, he had formed his own opinions on the impact of large-scale, mechanised farming operations, and he provided me with important preliminary insights into the materiality of soybean production in Mato Grosso.

By the end of this stage in Cuiabá I had information to decide on the location of the two empirical case studies. I needed to find a location where there was a farming cooperative producing soybean under the 'social biodiesel' programme which would then enable me to connect land-use practices to actual biofuel production. Following the above-mentioned preliminary visit to northern Mato Grosso – the biggest soybean production region in the state - and the meeting with the Consórcio official in Sorriso, I made a preliminary visit to Ipiranga do Norte where a union of rural workers was involved in 'social biodiesel'. There, I obtained a fuller picture of the workings of the PNPB's social stamp and role of unions.

However, for a number of unassailable reasons, I chose Nova Ubiratã as the preferred location for grounding my case study. To begin with, the Consórcio official included me on one of her supervisory visits to the municipalities where I was introduced to the President of Coopertã, the cooperative of family farmers of Nova Ubiratã, which was also working with the 'social biodiesel' stamp. As explained below, I had been involved in a car crash that same morning and so my ability to visit sites, and meet my timetable was compromised all at once. When he learned of the incident, the President of Coopertã immediately offered me generous support, which included the provision of working space in

Coopertã's office and assigning me a driver who would take me in a Cooperatã vehicle to various holdings. Moreover, one farmer kindly suggested that I stay at his house. Since the logistical aspect of the study was now guaranteed, I decided to choose this location.

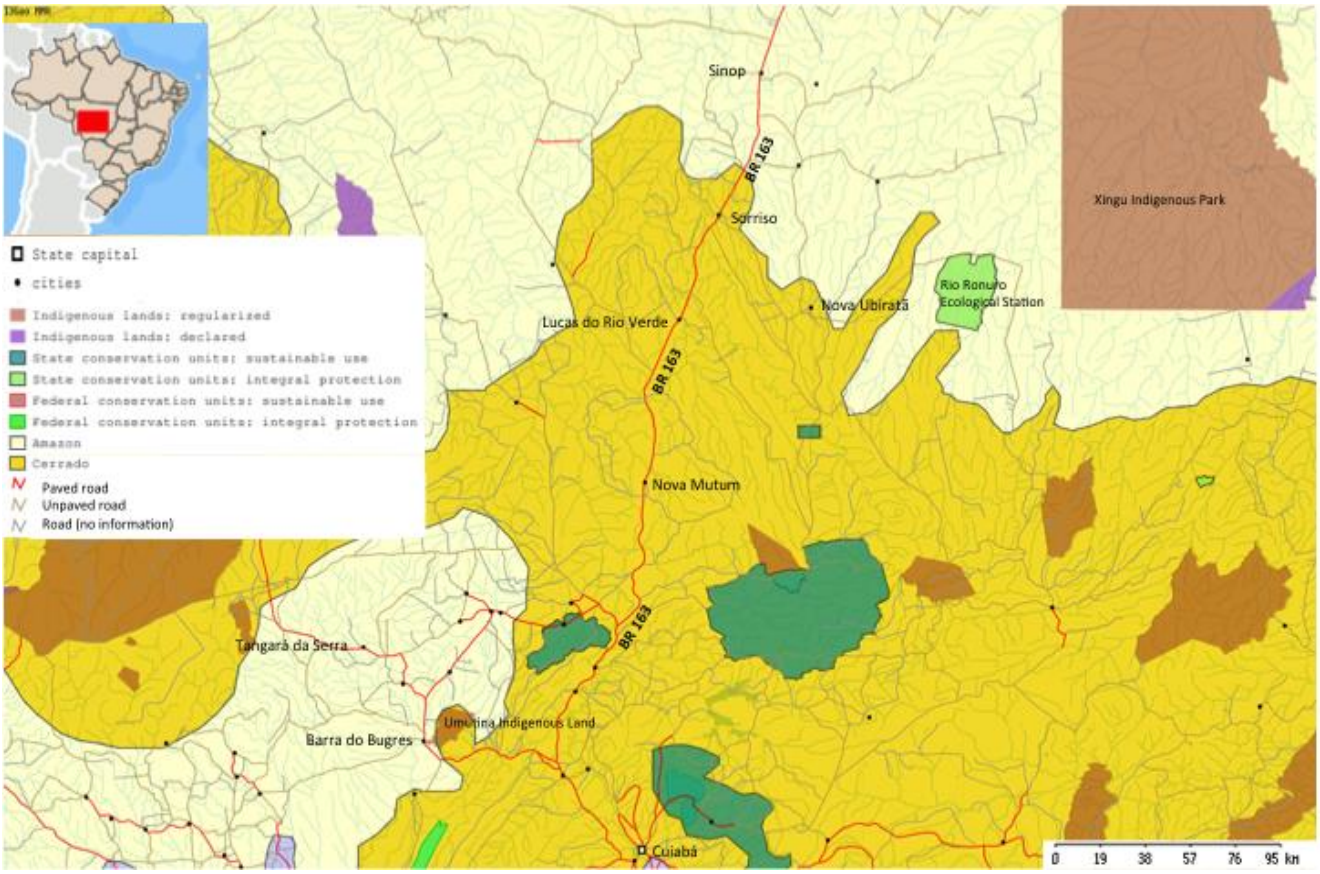
The choice of the second case study was decided whilst I was in Cuiabá. The major sugar cane region of Mato Grosso is located in the High Paraguay river basin and I could have chosen from a number of distilleries operating there. I picked Barralcool in Barra do Bugres for two reasons. Firstly, I had the support of the Sedraf Vice-Secretary who introduced me to the distillery president. Secondly I met a master student at the UFMT who was from Barra do Bugres and whose family had connections with the big landowners. She was willing to introduce me to individual farmers, 'opening doors' for my research.

Following initial ground work in Cuiabá, the third stage was concerned with completing detailed research at case study locations. I undertook in-depth interviews with farmers at their holdings or in the Cooperative or distillery headquarters (ten in Case Study 1 and eight in Case Study 2); as well as the relevant State and non-State actors: municipal administrations, officials at regional offices of environmental agencies (Ibama in Case Study 1 and SEMA in Case Study 2), and rural unions.

Regrettably, there were some omissions in obtaining data for Case Study 1, where I was unsuccessful in setting up interviews. For example, I would have liked to interview representatives from local industry who were involved in the commercial process of buying soybeans from Coopertã, within the BR163 soybean-processing region. Although I met with the representative of Fiagril in person at their headquarters in Lucas do Rio Verde, his promise to answer a subsequent email request for an interview was not replied to. It was also not possible for the representative from Bunge (industrial unit in Nova Mutum) to find a suitable time to receive me. While I did talk to workers of the Caramuru and Cooperbio industries, I was not able to reach those dealing specifically with the social stamp mechanism of the PNPB.

The fourth and final stage of my research was undertaken in São Paulo and Brasília in early 2013. It involved an initial preliminary analysis of the collected data and final interviews to clarify points or identify and resolve any gaps in the data. These included meeting officials at the Ministry of the Environment (MMA), Ministry of Agrarian Development (MDA) and the BNDES in Brasília; national-scope environmental NGOs such as Greenpeace and ISA members; as well as scholars at the UnB and the USP.

Figure 3.1 The fieldwork area in Mato Grosso.



Source: MMA open layers at: http://mapas.mma.gov.br/i3geo/mma/openlayers.htm?kk57trtggdn41e2vn72gfs6hu6.

3.5 Research experiences

The complexities of this programme became apparent once I was in the field. Brazil's size and relatively poor transport infrastructure meant that logistics and accessibility between case study sites and the cities of Brasília, Cuiabá and São Paulo were difficult and expensive. By allowing for a twelve

month stay in the country, I was able to build in a degree of flexibility that was sufficient for the completion of the study, as I had predicted that unforeseen issues could occur in the field.

I intentionally immersed myself in Brazilian culture prior to and during the fieldwork in 2012 and 2013: from popular culture, Brazilian media and literature to music; and undertook interesting discussions with Brazilians in London and in Brazil to better understand the political and economic 'paradoxes' of the country. Brazil indeed is not a country 'for beginners' and any easy explanation of its complexities will eventually fail.

My early preparations included not only studying the key policies and actors but also the practicalities of living in Brazil. The fact that I am a native speaker of Portuguese certainly provided me with the relevant skills for examining documents and with communication in general. I was therefore reasonably confident and optimistic about carrying out the fieldwork even though I was aware that I would need to identify and locate the majority of actors from a sampling process after arriving in Brazil. As seen above, most of the actors I wished to interview did not answer my emails but I did manage to reach most of them eventually through other parties. In fact, informality proved to be an important aspect of this process, and a combination of networking and the 'snowballing' exercise brought me into direct contact with the interviewees.

Although this thesis was not primarily concerned with land-struggles, endangered livelihoods, or the protection of indigenous communities, these issues were nevertheless present in the case studies. Violence is omnipresent in the Centre-West of Brazil, both in urban settings in the fast growing cities, and rural areas where there are socio-environmental struggles. Therefore there were issues of safety underpinning not only my own safety but also potentially when coming into contact with vulnerable people, or when needing to gain access to, or passing through certain 'hotspots'.

It was therefore important to undertake a careful risk assessment, as required by King's College London. Fortunately there were no serious incidents involving physical violence. One tense situation arose during fieldwork for Case Study 2 when I was expelled from the ethanol distillery (see Chapter 8), but apart from experiencing a natural degree of fear at the time, the effect on my research was

minimal by slightly reducing the amount of time I had originally planned on spending on this case study.

However, there were some unforeseen circumstances and unavoidable setbacks that inevitably affected my fieldwork in the short term. When I was in Sorriso, for instance, I was involved in a car crash with the car I had rented and another oncoming vehicle. Due to the lack of public transport in Brazil and especially in Mato Grosso, a car was essential for conveying me between locations for the case studies and for reaching the capital Cuiabá. In the case of Brasília, had I not succeeded in finding an alternative means of transport, it would have been much more difficult to conduct interviews (sometimes several in the same day in different corners of the city). In any event, the car crash in Sorriso did not undermine my fieldwork chronogram but admittedly, it did affect my spirit temporarily, as well as my budget[57].

Fortunately, I was able to keep to my schedule, as planned, by travelling to the location of Case Study 1 that very afternoon, by accepting an offer of a car transport with the Consórcio official. But a different sort of implication arose in both case studies. Despite the kindness of the Coopertã President in assigning a driver to take me to my desired locations, I could not plan ahead or move around as freely as I would have wished, as I had to adjust my working hours to those of the Coopertã. So it was not possible to carry out interviews of some actors at times that suited me, including at weekends. As I was staying with a farming family for most of the period of Case Study 1, who made the most of the weekend for family activities, it would have been churlish of me not to join in or ask the farmer to drive me to an interview during his period of relaxation. A similar situation applied in Case Study 2 where I was again staying with a friend of the local farming community. I tried to compensate for this 'lost time' at the weekend (not really lost as the family dynamics was also interesting to observe) by taking as many interviews as possible during the working hours, e.g., when in Coopertã headquarters, by seizing the opportunity to request an interview with every farmer who arrived seeking assistance from the cooperative. In this way I managed to avoid possible sampling biases (e.g. the Coopertã President driving me to selected holdings for interviews).

[57] I needed to pay R$ 2,000 given the lack of a 'comprehensive insurance', which was a huge constraint on my research budget. Hence, I did not rent any more cars whilst in Brazil and tried to restrict travelling in the country to that which was strictly necessary. Subsequently this event did absorb more of my time as I had to deal with paper work for an insurance claim that unfortunately did not cover the full costs resulting from the accident.

A separate issue arose in Brasília when my computer was stolen from the car trunk in the National Congress parking lot. I lost some data, notably GIG data that I had been compiling but fortunately I had backed up the remaining data essential for the research. Again, filling a report for the police as well as the insurance paperwork did absorb some time but the outcome was more positive than I had expected as the expenses for a new computer were covered.

These time-consuming and anxiety-ridden setbacks were compensated for by the relatively flexible programme of work and extended time frame that allowed me to undertake the necessary steps for the research. The support of friends and gate-keepers in the field was crucial in helping me to overcome these setbacks.

I knew beforehand that being in Brazil in 2012 would provide me with a 'golden' opportunity to explore the dynamics surrounding the Rio+20 summit in Rio de Janeiro (marking 20 years from the UN Earth Summit in Rio de Janeiro in 1992), and to experience for myself the animation of the new Forest Code discussions; or even the municipal elections in late 2012. Apart from these planned events that I tried to capitalise on during my fieldwork, I was also able to take advantage of some unforeseen events, as seen above. The research thus proved to be eventful, but there were also moments of serendipity. The many unexpected issues, events and actors I came across unexpectedly ended up enriching the research.

3.6 Summary

In order to assess the possible interactions between biofuel and deforestation control policies in a context of geopolitical dynamics, this PhD draws on a qualitative methodology designed to assess causal dynamics relating to reciprocal policy development and influence in Brazil. It does so via a case study approach, following a methodology described by Yin (2009), using multiple sources of evidence to help ensure the validity of data.

Two case studies assess how the biofuel/deforestation control policy dynamic is 'grounded' via ethanol and biodiesel production in Brazil. Broadly, the methods used included semi-structured interviews, documentary analysis and direct observation as I conducted fieldwork at multiple scales (ranging from the local level of production up to the national level). Having described the methodology

of the PhD, the thesis now turns to background issues on Brazil and Mato Grosso, in particular the policy and economic framework of biofuel and deforestation control and the context of the case studies.

Chapter 4. **Biofuel production and deforestation control in Brazil**

This chapter provides the socio-economic and political context to the empirical chapters that follow and introduces the actors involved in biofuel and deforestation control policies. It starts with an overview of Brazil and Mato Grosso's political economy, so as to better understand the shaping of environment-society relations. The chapter then considers Brazilian deforestation control policies, with specific reference to the Amazon deforestation control programme (the PPCDAm). Next, it outlines Brazilian policies promoting biodiesel (the PNPB) and ethanol. The chapter finally describes the socio-economic and environmental contexts of the case studies: the municipality of Nova Ubiratã where Case Study 1 is located (Coopertã - soybeans for biodiesel production), and Barra do Bugres, the location of Case Study 2 (Barralcool – sugar cane for bio-ethanol production).

4.1 Political economy in Mato Grosso and Brazil

Brazil is the world's fifth largest country, by both surface area (8,515,767 km^2) and population (over 200 million people). Occupying nearly half of South America, it has diverse climates, ranging from equatorial in the north, semi-arid in the northeast and temperate in the south; its varied biomes such as the Amazon or the Cerrado[58] make it a global mega-biodiverse powerhouse. Brazil is also a top commodity exporter, encompassing a wealth of minerals, arable land, fossil fuels and fresh water resources.

Since Brazil's 'discovery' by the Portuguese in 1500, such wealth has driven geopolitics and settlement strategies while informing nation-state building efforts (Moraes, 2011). Different commodity cycles shaped the country's territorial formation. These involved intense environmental degradation, decimation of indigenous populations, and extremely unequal land ownership derived from colonialism, especially slavery (Dean, 1995; Ribeiro, 2000). This colonisation meant that raw materials and agricultural goods were exported for the exclusive benefit of the colonial power; the resulting pattern of land occupation and territorial organisation reflected this objective while still informing contemporary environment-society issues (Prado Júnior, 1967).

[58] The Cerrado is a South American woodland-savannah, composed of a mosaic of different vegetation types, including tree and scrub savannah, grassland with scattered trees, and patches of dry forest. It is high in biodiversity, has a significant GHG stock potential and is where the headwaters of major South American rivers are located (e.g. the São Francisco, the Paraguay, the Xingu or the Paraná) (see Oliveira and Marquis, 2013).

The contradiction of land availability and scarcity (i.e. unequal access to land) in such a large territory is rooted in the Portuguese system implemented from the 1530s (Wolford, 2010). Land along the coast was divided into 14 hereditary captaincies with rights to develop the territory granted to nobility allied to the crown (Johnson, 1987; Skidmore, 2010). Within these captaincies, land was distributed to those connected to the Portuguese crown who were expected to exploit the land profitably; otherwise, it would revert to the crown as vacant land[59].

The first agricultural commodity cycle was sugar, with Brazil the world's largest sugar exporter between 1580 and 1680 (Schwartz, 1987). Extremely unequal land ownership was the norm. A tropical plantation economy based on African slave labour started on the northeast coast with export-oriented plantations ruled by powerful *fazendeiros* (landowners)[60]. Here, colonial society was forged so deeply that it yet influences modern Brazil (Prado Júnior, 1967; Schwartz, 1987).

The quest for further natural resources and the need to repel rival Spanish colonisation efforts led to Portuguese expansion inland through a predatory practice called *bandeirismo*. The *bandeirantes* (literally 'flag bearers') were armed Portuguese bands that roamed across the territory enslaving indigenous peoples as they went (Hemming, 1987). This led to the discovery of gold at the end of the 17th century in the state of Minas Gerais (and later in Goiás and Mato Grosso states), followed by diamonds, and marked the beginning of a rush of migrants inland, creating a more polycentric Brazil[61]. Following these endeavours, the captaincy of Mato Grosso was created in 1748 with the objective of strengthening Portuguese colonial control.

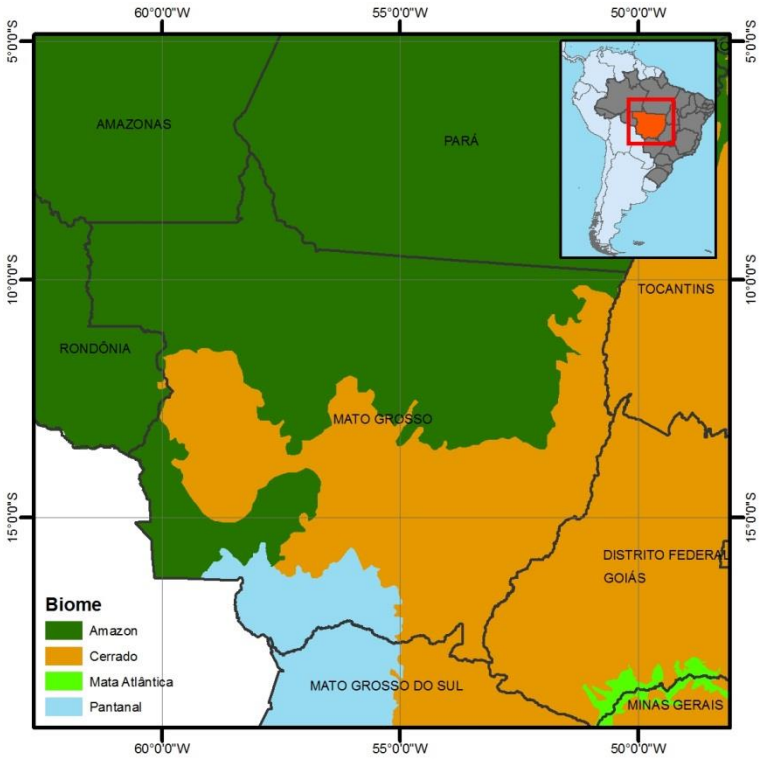
[59] This is related to the land tenure system of *sesmarias*, created in Portugal in 1375 by king D. Fernando I. Hereditary land grants were distributed to reduce the amount of unproductive land in the country, and if land was not used, it would revert to the Portuguese crown (Wolford, 2010; Skidmore, 2010).

[60] This reality was depicted by Gilberto Freyre's historiographical and anthropological essay "The Masters and the Slaves" (1946), with power concentrated in the *Casa Grande* (big house) of the *fazendeiro* (land owner), while the *Senzala* (slave quarters) was on the other end of the unequal power relation.

[61] This *bandeirismo* (together with Jesuitical missions) had a crucial role in establishing early settlements in the vast interior and hence enlarged the Portuguese territorial claims beyond the line of the Tordesillas Treaty, which in 1494 had divided the world in two for the Portuguese and Spanish crowns.

Located in the Centre-West region, Mato Grosso is the third largest state with 903,357 km^2 (more than France and the UK combined). This state has a landscape alternating *chapadas*[62] with plain areas suitable for mechanised agriculture. To the south, a large flooded plain forms the Pantanal, the world's largest wetland[63]. The central part of the state was originally mainly composed of Cerrado vegetation while the northern part is located in the Amazon biome (see Figure 4.1). The distribution of vegetation formations is rather complex between the Amazon and Cerrado biomes; both are composed of different vegetation formations, from more forested-like ones to more savannah-like ones, and the boundary between the biomes (or ecotone) is hard to define. These features are reflected in the name of the state: 'thick bushes'; they handicapped colonisation and communication, explaining isolation of the state until the 20th century.

Figure 4.1 The biomes of Mato Grosso.



Source: Policymix, in http://policymix.nina.no/Case-studies/Brazil-Mato-Grosso, accessed 16 July 2015.

[62] A *chapada* is a plateau typical of the Brazilian highlands.
[63] Extending 210,000km^2 across the Brazilian states of Mato Grosso and Mato Grosso do Sul, eastern Bolivia and eastern Paraguay, the Pantanal is a mosaic of flooded grasslands, savannahs and tropical forests.

In 1890 Brazil became a Republic[64] based on a federation of states, marking a new political reality, which increased the powers of regional oligarchies, such as coffee plantation owners in São Paulo or Mato Grosso's large cattle ranchers (Skidmore, 2010). Since then, the latter have continued to appropriate land from traditional communities. Rubber tapping regions in the valleys of Teles Pires River (Case Study 1) and Paraguay River (Case Study 2), for instance, were thus seized in the early 20th century (Barrozo 2010). The process followed a similar pattern to other regions, resulting in violence, dispossession and very unequal land distribution.

A revolution in 1930 challenged the policy of governors and oligarchic states, while also questioning the coffee monoculture that had developed (Ianni, 2004). With the revolution came the populist and authoritarian Getúlio Vargas regime (1930-1945 and then democratically elected from 1951-1954)[65] which curbed regional powers and fostered a national identity (Skidmore, 2010). Focusing on industrialisation, Vargas created the BNDE[66] in 1952 followed by the State oil enterprise (Petrobras) in 1953, as part of a grand strategy of national-developmentalism via a more centralised economy (Hochstetler and Montero, 2013).

Such politics brought great changes to the Centre-West and the Amazon. He fostered a *Marcha para Oeste* (March towards the West) in the 1940s and created the Superintendency for the Economic Valorisation of Amazonia (SPVEA) in 1953, an organisation focussed on executing a regional development plan for the Amazon, centred on agriculture (Hecht and Cockburn, 1989). To facilitate this, the *Amazônia Legal* (Legal Amazon) was also created in 1953, a vast new planning region covering approximately 5 million km^2 or 59% of the national surface area, including Mato Grosso (see Figure 4.3).

The Mato Grosso authorities collaborated with Federal plans giving away more than 4 million hectares for colonisation in the 1950s (Jepson, 2006; Barrozo, 2010). Many of the companies that acquired these lands (often through political connections) simply maintained these large estates as a reserve of

[64] Following independence from Portugal in 1822 and the institution of a Brazilian empire, Brazil then became a Republic in 1890.
[65] Vargas was removed from office in 1945 by the military who feared a rising populist mobilisation of workers. Democratic elections followed with General Dutra being elected (Skidmore, 2010). In 1951 Vargas managed to win elections democratically. After he committed suicide in 1954, Juscelino Kubitschek succeeded him, proceeding to the construction of a new capital inland, Brasília.
[66] Born as a bank of the great industrial and infrastructure projects, the BNDE (currently BNDES) is now one of the largest State development banks in the world, and a fundamental financial instrument in the infrastructure investments in Brazil and elsewhere in Latin America, besides supporting the international expansion of Brazilian companies (Hochstetler and Montero, 2013).

economic value until the end of the 1970s (Barrozo 2010). The process was awash with bureaucratic irregularities and out-and-out corruption, with duplication of land titles quite common (Jepson, 2006).

Amazon colonisation was expanded during the repressive military regime, which began with General Castello Branco in 1964. During this period, Brazil enjoyed an economic boom, with significant growth in the industrial sector. Like much of the previous phases of development, industrialisation – based on import substitution and characterised by a triple alliance of transnational corporations, national entrepreneurs and state companies – benefitted mainly the elite (Evans, 1979).

Meanwhile, agrarian reform became a pressing issue, as large numbers of landless people threatened the stability of the export-oriented large holdings[67]. The preferred solution, going back to the days of the Vargas regime was to give away 'virgin', 'unoccupied' lands, especially in the Amazon, so as to avoid inconveniencing established big landowners (Velho, 1979; Ianni, 2004; Passos, 2010).

In turn, the National Institute of Colonisation and Agrarian Reform (INCRA) was created in 1970 specifically to regulate the occupation of these Amazonian lands. It did so through two main processes: official colonisation by the Federal State for the purpose of agrarian reform and private colonisation.

A crucial support for private colonisation projects was conferred by the Superintendency for the Development of Amazonia (SUDAM). It was created in 1966 replacing an early agency created under Vargas, and focussed on the Legal Amazon to implement its agrarian and economic policies, offering incentives for occupation by big agricultural and industrial firms while also providing infrastructure projects and fiscal subsidies (Hall, 1989; Furtado 2010). Furthermore, with the decrees 1164/71 and 1414/75, 60% of Mato Grosso's lands were placed under the rule of the military government, with the aim of executing agrarian reform notably alongside federal roads (100km on each side to be precise), such as the Transamazônica and the Cuiabá-Santarém (BR163), both built in the 1970s (Alves and Neto 2010). These roads were financed by the Plan for National Integration (PIN), launched in 1970[68]. This occupation was a geopolitical strategy aimed at the integration of frontier areas, but also the associated tapping of the Amazon resources (Dodds, 1993; Oliveira, 1997; Hall, 2000).

[67] For more on the *Movimento dos Sem Terra* (the landless people movement), the MST, see Wolford (2010).
[68] Decree-Law 1106 of 16 June.

In the meantime, private colonisation by national and international companies was strongly boosted, particularly after 1974, based on generous fiscal incentives offered by SUDAM. Such colonisation focussed on cattle ranching, prompting large-scale land speculation and deforestation (Bernardes 2007). At the same time, and squeezed by agricultural modernisation, settlers from the southern states of Rio Grande do Sul, Paraná and Santa Catarina migrated to Mato Grosso both to acquire larger farm holdings and to maximise their chances for social mobility (Coy and Lucker 1996)[69]. Private colonisation in general allowed Mato Grosso to become an agricultural powerhouse as, combined with state loans, it enabled agriculturists to gain secure property rights while lowering the risks and transaction costs of frontier settlement (Jepson, 2006).

From the 1970s, further expansion was possible due to agricultural innovations, such as new crop varieties adapted to the Cerrado by Embrapa (the Brazilian agriculture R&D institute), cheap credit, and the support of the POLOCENTRO[70] (Egler 2007, Heredia et al. 2010, Sauer and Leite 2012). There was: crop diversification (notably the rise of soybean *Glycine max* (L.) Merrill)[71]; a priority for export commodities over subsistence farming; and increased mechanisation as well as intensive use of agro-chemicals (Procópio, 1992). Concurrently, major changes occurred in the social structure with a deepening of land concentration that displaced socially weaker groups (Coy and Lucker, 1996; Bernardes, 2007; Skidmore, 2010).

A reliance on agricultural commodity exports became even greater following onset of the debt crisis of the 1980s[72] as it enabled the rapid generation of revenue to meet foreign-debt obligations (Sauer and Leite, 2012: 879). The process of democratisation, starting in 1984 did little to change this pattern. Indeed, in the 1990s, the Fernando Henrique Cardoso (FHC) government (1995-2003) was focused on macro-economic stability, liberalisation and opening of markets – all of which contributed to the strengthening of agribusiness. The subsequent PT governments of Lula da Silva (2003-2011) and Dilma Rousseff (2011-present) retained a focus on macroeconomic stability, and support for mega-infrastructure in the Amazon, and agribusiness in general, notwithstanding their commitment to the reduction of inequalities.

[69] An estimated 22,150 land lots and a total 3,946,889 hectares from 1970 to 1990 were thus allocated (Jepson, 2006).
[70] POLOCENTRO, for the Centre-West region, provided credit facilities for agriculture projects as well as the opening of roads notably in Cerrado areas which were flat and hence favourable to mechanisation (Dubreuil et al., 2005).
[71] Soybean started to be cultivated in Rio Grande do Sul in the 1950s and in Mato Grosso in the 1970s (Embrapa, in http://www.cnpso.embrapa.br/producaosoja/SojanoBrasil.htm, accessed 22 August 2015).
[72] This crisis resulted from the oil shocks of the 1970s, growing national debt, decrease in trade and the rise of world's interest rates and led to IMF intervention starting in 1982 (Baer, 2008).

However brief, this overview has highlighted that agricultural interests are not only deeply connected with historical, and decidedly unequal land access, but also have a crucial role in explaining current socio-environmental dynamics. These interests and their regional oligarch powerbases have controlled the political processes since independence in 1822 (Velho, 1979)[73]. 'Agribusiness'[74] is indeed a key economic sector as it corresponded to 23% of GDP and was responsible for 41% of exports in 2013, according to the CNA[75]. It has a very powerful political lobby organisation, the National Confederation of Agriculture (CNA), and is supported by pro-business think tanks like ICONE; not surprisingly, it is well represented in the National Congress with the *Frente Parlamentar da Agropecuária* or 'ruralist front', regularly holding many seats[76]. Such representation even extends today to the PT-led coalition in the National Congress, which includes the centrist PMDB[77]. Such power is notably enabled by an overrepresentation of parliamentarians from less populated, agribusiness-oriented states compared to members from urban centres – in itself an expression of regional oligarchies' power[78]. In the current Executive, tensions thus exist between pro-agribusiness stances and the traditional PT stance in favour of agrarian reform. Meanwhile, the separation of matters relating to agribusiness in the Ministry of Agriculture, Livestock and Supply (MAPA) from those concerning family farmers and agrarian reform in the Ministry of Agrarian Development (MDA), is a vivid example of the fault line shaping Brazil's countryside and society in general.

Such power dynamics extend to the state-level - and were particularly evident when Blario Maggi, one of the biggest soybean producers in the country was elected governor of Mato Grosso (2003-2010). Thus, the agribusiness sector in Mato Grosso is represented by the Mato Grosso Federation of Agriculture and Livestock (Famato) whose political-economic power is especially high – notably evinced in the state's parliament, the *Assembleia Legislativa do Estado de Mato Grosso* (ALMT) where it usually holds a plurality of seats - given the commodity-orientation of the state. Mato Grosso

[73] For instance, agrarian reform fears among the rural oligarchs may well have been behind the military coup of 1964 that overthrew President Goulart (Ianni, 2004).
[74] Agribusiness is a debatable and politicised category (see Chapter 8). Very briefly, though, it is applied to "systems for the production of commodities by means of large-scale monoculture, mainly for export" (Fernandes et al., 2012: 37), deeply interconnected with industry, in opposition to the peasantry, whose territoriality is based on a vision of land as means of survival rather than capital accumulation. This dichotomy would hence mirror the long-standing, but academically contentious, divide between 'farmer' and 'peasant' (Silva, 2007).
[75] In Rede Brasil Atual, 23/10/2014.
[76] Many parliamentarians are also large land owners making the relation between politics and agribusiness invariably promiscuous (Castilho, 2012).
[77] *Partido do Movimento Democrático Brasileiro* (Brazilian Democratic Movement Party).
[78] Brazil has a bicameral National Congress with a 513-seat Chamber of Deputies (lower house) and a 81-seat Senate (the upper house), with representatives of 26 states and the federal district of Brasília. The representatives in the lower house are fragmented across 28 political parties. In general there is a loose political ideology, being common for parliamentarians to change party. Other fault lines are perhaps more consistent, such as the ones conferred by the interests of agribusiness or the evangelical lobby, both spreading across different parties.

has become one of the most productive agricultural regions in Brazil since the 1990s and is a leading producer of grains (i.e. first in Brazil for soybeans) (Passos 2010).

The colonisation process in Mato Grosso further entrenched an extremely unequal land ownership structure. The territories of traditional communities[79] were encroached upon leading to ubiquitous violence and environmental degradation (Oliveira, 1997; Castro et al., 2002; Souza, 2008; Passos, 2010). Agrarian struggles and rural violence remain high in Mato Grosso, and are commonly associated with the imposition of entrepreneurial monoculture (CPT, 2013; Sato et al. 2014). Family farming - represented by the Federation of Agriculture Workers of Mato Grosso (FETAGRI) – is becoming increasingly 'peripheral' both politically and economically (Bernardes and Aracri 2011).

Given massive agricultural expansion in Mato Grosso, it is not surprising that this state has had the highest national deforestation rates since the 1990s. Agriculture expanded from the Cerrado lands north and west-wards. The ecological cost is immense. Ferez and Micol (2012) estimate 346 million tonnes of CO_2 emissions per year from land-use changes between 1994-2002 alone (27% of Brazil's total); 73% of which were due to conversion to pastureland (see Figure 4.2). Meanwhile, during 2002-2010 those emissions fell to about 221 million tonnes of CO_2 per year probably due to more stringent enforcement of deforestation control policies (Ferez and Micol, 2012). Still, net deforestation remains significant and the state still has the highest level of accumulated deforestation in the Legal Amazon, with 136,102 km^2 in 2012, (and these figures do not include forest degradation)[80].

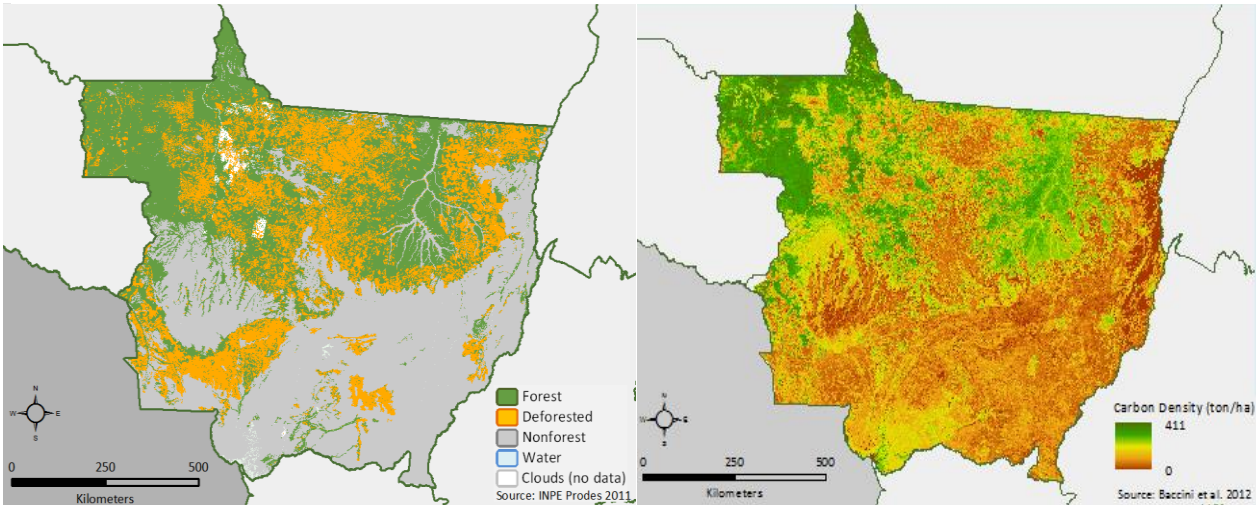
The socio-environmental impacts of such agricultural expansion are the main concerns of local NGOs. These include the Mato Grosso Forum on Environment and Development (Formad); the *Instituto Centro de Vida* (ICV) which is the main Mato Grosso-wide NGO; the nation-wide *Instituto Socioambiental* (ISA) with a special focus on indigenous rights and in the Xingu area of Mato Grosso; the international NGO The Nature Conservancy (NC) with an important role in the support to municipalities with deforestation control strategies; or Greenpeace which, while without a specific programme in Mato Grosso, is one of the key international NGOs acting in the Brazilian Amazon.

So far we have seen how different commodity cycles, from colonial times to the present, have led to destructive and unequal land settlement processes even as they forged Brazilian society, economy

[79] Traditional communities in Brazil include indigenous peoples, *quilombolas* (descendants of African slaves), rubber tappers, Brazil nut extractors, or fishing communities, with different livelihoods and territorialities from agribusiness (Sauer and Almeida, 2011).
[80] PRODES data in INPE's website, http://www.obt.inpe.br/prodes/index.php, accessed 4 September 2015.

and politics. Mato Grosso, in particular, has undergone a recent, State-led land settlement based on mass migration. Consequently, there was great privatisation of lands, leading to deforestation, and the establishment of vast monoculture crops, such as soybeans. This agricultural development has indeed contributed to the development of that state as a major agricultural producer in Brazil, with the importance of agribusiness visible in the state's politics. The chapter now turns to an overview of Brazilian deforestation control policies.

Figure 4.2 Accumulated deforestation in Mato Grosso by 2011 (left) and carbon density (right).



Source: GCF (Governors' Climate and Forest Taskforce), in http://www.gcftaskforce-database.org/StateOverview/MatoGrosso, accessed 16 July 2015.

4.2 Environmental policy and Amazon deforestation control

The 1972 UN Conference on Environment and Development, the process of democratisation in the 1980s, and Brazil's hosting of Rio92, paved the way for a diverse set of environmental institutions and policies (see Table 4.1). Yet despite these developments, environmental policy suffers from implementation problems. Many laws, while appearing good on paper, are "merely symbolic, passed to satisfy some political interests but never truly intended to be implemented and enforced" (McAllister 2008:4) – which is to say '*para inglês ver*'[81]. National interests (e.g. agribusiness) remain protected, while still responding to international criticisms regarding environmental destruction (Freitas and Mozine, 2015).

[81] A Portuguese language specific expression which literally means 'for the Englishman to see' and which is used to express the idea that something is merely for the sake of appearances (see Freitas and Mozine, 2015).

Indeed as McAllister (2008) has notably illustrated, diverse authorities may either disregard their legal obligations or behave strategically to avoid regulation, e.g. by using their political connections to affect certain decisions or to weaken environmental enforcement agencies. This situation is rendered even more complex due to Brazil's federal structure and the decentralisation process embarked on after 1988, as state governments gained more power, including over environmental policy. As such, state SEMAs (Environment Secretaries) may not be committed to seriously tackling environmental problems, as they are influenced by local power oligarchies connected to agribusiness (Hall, 2000). In Mato Grosso, besides the SEMA, in charge of environmental licensing of rural holdings, there is too the Planning Secretary (SEPLAN) which has a crucial role in running land planning policy, including zoning plans. Here again being beholden to agribusiness is the norm.

Table 4.1 A selection of major developments in Brazilian environmental policy and institutions.

Year	Policy and institutional developments
1973	Special Secretary for the Environment (SEMA)
1981	National Environmental Policy (NEP)
1984	Advisory Group for Environmental Policy (CONAMA)
1988	Constitution - giving more recognition the territorial rights of traditional peoples and detailing a comprehensive set of environmental provisions
1989	'Our Nature' package - improved environmental legislation and policy, leading to the centralization of environmental agencies in IBAMA
1992	Ministry of the Environment (MMA) – coordinate activities related to the NEP
1998	Environmental crimes law

Source: Hall (2000); Hochstetler and Keck (2007).

In this setting, deforestation has been ubiquitous. Thus, roughly 18% of the Legal Amazon cover has already been deforested, mostly in the 'Deforestation Arc' going from eastern Maranhão, through Tocantins, Pará and Mato Grosso, Rondônia, and towards the state of Acre (see Figure 4.3)[82].

[82] This figure, however, corresponds only to the actual felling of trees in forested vegetation typologies, and hence it does not include the gradual degradation of forests or the deforestation of other vegetation typologies in Cerrado and Amazon biomes.

Spreading north and westwards, the Arc coincides with the agricultural frontier, which, starting in the Cerrado biome, has moved inexorably towards the centre of the Amazon biome itself.

Such high levels of deforestation meant that LULUCF ('land-use, land-use change and forestry') corresponded until recently to the greatest part of Brazilian GHG emissions (77% in 2005, according to Brazil's second communication to the UNFCCC, 2010), thereby contributing to Brazil's prominent position in the world's emissions rankings (6th biggest emitter of CO_2eq in the world in 2012, after China, the US, India, Russia and Indonesia)[83].

Given international attention since the 1980s, Brazil has implemented various deforestation control measures with several programmes enacted with international financing such as the PPG7[84] and the ARPA[85]. Policies during the 1990s and early 2000s focused on Conservation Units (CUs) and indigenous reserves. Most of these were created in areas with limited human pressure on resources, and featured *ad hoc* enforcement and control actions following particular incidents. Once again, though, there was a lack of policy articulation, incomplete implementation and ineffective control, that is, '*para inglês ver'*. As a sole focus on CUs was seen as ineffective, the Federal government in 2004 launched the Programme for the Prevention and Control of Deforestation in the Amazon (PPCDAm), grouping together different national ministries to thereby better promote coordinated action.

This programme's first axis of action has concerned land regularisation. Given the land holding chaos in the Amazon, there is a diversity of land ownership situations: non-designated public lands; public lands occupied informally or under dispute; federal lands allocated to agrarian reform settlements, conservation units or indigenous lands; and private lands, most without formal title (Barreto and Brito, 2013). Such uncertainty is an administrative problem that amounts to being a major obstacle to deforestation control, notably related to centuries-old illegal private encroachment on public lands with

[83] Brazilian per capita emissions were 9.18 tCO_2eq (compared to 18.55 in the USA; 15.75 in Russia; 8.22 in the EU; 7.91 in China; and 2.33 in India). The carbon intensity of the Brazilian economy, in turn, was 640.74 tCO_2eq/million $US GDP (compared to 735.39 in China; 675.51 in Russia; 470.03 in India; 366.74 in the USA; and 238.44 in the EU). Data available at the World Resource Institute, in http://cait.wri.org/, accessed 4 September 2015.

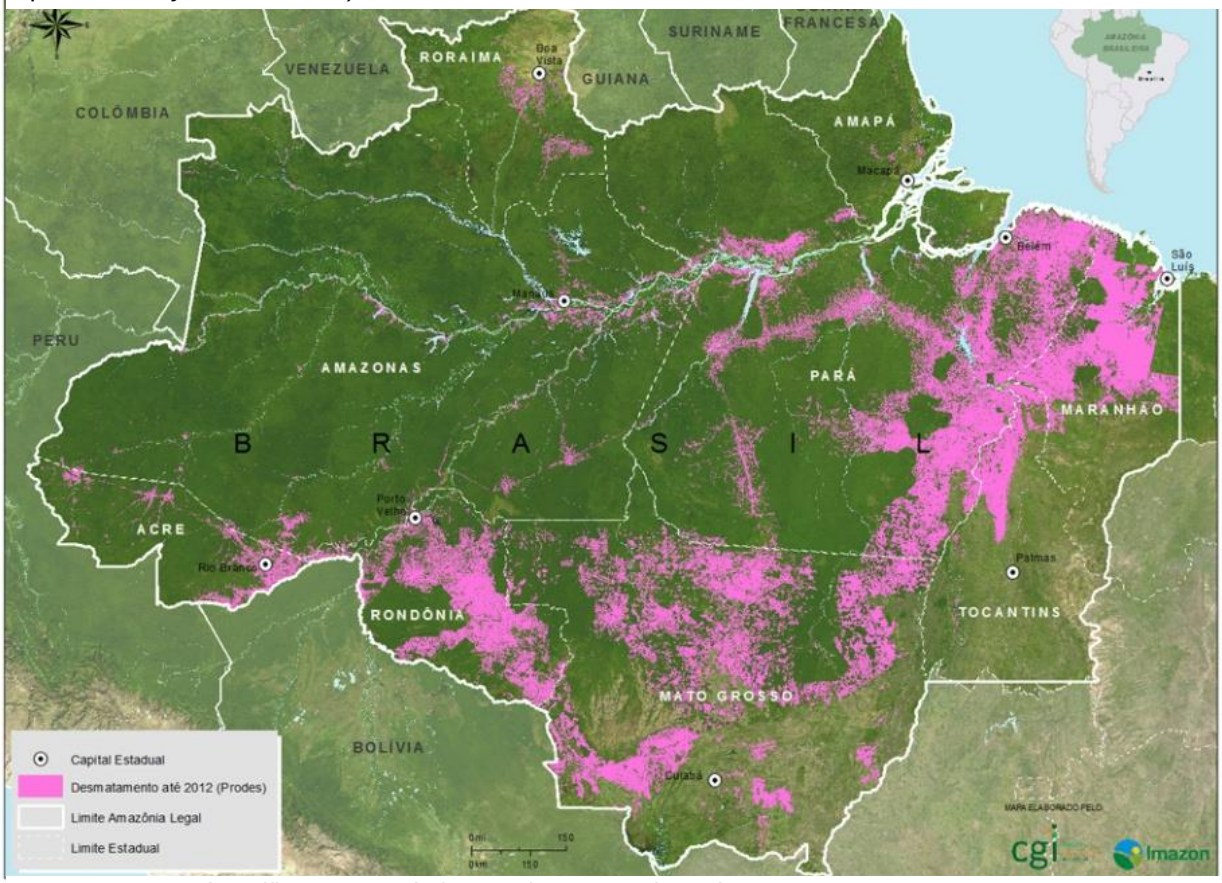
[84] Launched during Rio92, and with resources from the G7, the WB and Brazil, the Pilot Programme to Conserved the Brazilian rainforest (PPG7), contributed to the creation of numerous CUs in the Brazilian Amazon and environmental policies. For more see http://www.worldbank.org/en/news/feature/2012/07/19/ppg7-maior-programa-ambiental-brasil.

[85] The Amazon Region Protected Areas Program (ARPA) was launched in 2002 to strengthen CUs in the Amazon. It has recently received US$ 127.49 million (R$ 477 million) which would allow the financing of 60million hectares of UCs in the next 25 years. It is coordinated by the MMA, financially managed by *Fundo Brasileiro para a Biodiversidade* (Funbio), and the sources of financial resources are the GEF, the WB, Germany (the German development bank), the WWF and Fundo Amazônia (managed by the BNDES). In: http://revistaamazonia.com.br, accessed 22 May 2014.

false titles (*grilagem*). Barreto et al. (2008) estimated that there were 42 million hectares of illegally possessed land in the Amazon with a further 40 million hectares subject to duplicate titles.

Indeed, since colonial times, a pattern of *ad hoc* land claims has had more to do with actual physical possession (such as squatting) than legal recognition (Skidmore, 2010); following the *uti possidetis* principle (Latin for 'as you possess'), it became the main settlement principle in Brazil (Skidmore, 2010)[86]. Extensive deforestation has resulted as the Amazon was (re)occupied in the second half of the 20th century. In fact, settlers had to clear forest to prove possession even as illegal squatters in public areas cleared lands and quickly sold them on to other newcomers (Hecht, 2011). Speculation and fraud are thus intimately connected in this history causing deforestation and continuous agrarian expansion, notably through cattle ranching (see Chapter 6).

Figure 4.3 Map of accumulated deforestation (in pink) up to 2012, in the Legal Amazon (boundary represented by the white line).



Source: Imazon, http://imazon.org.br/mapas/, accessed 9 July 2015.

[86] The *uti possidetis* principle was also the key geopolitical factor that helped consolidate most of the Brazilian territory in the Treaty of Madrid in 1750, between Portugal and Spain, way beyond the Tordesillas line.

Axis 1 of the PPCDAm thus inevitably had to have a focus on the regularisation of informal occupations in public lands, notably with the *Terra Legal* Programme[87], administered by the MDA with support from INCRA. By doing this, though, it can be seen as promoting the privatisation of public lands in the context of a seemingly endless stream of new migrants. Indeed, the Executive has thus allowed a significant part of federal lands to become deforested as legally any farmer in the Amazon can clear at least 20% of their property.

Hence the really pressing question has been what to do with the federal forested lands still 'intact' in the Legal Amazon (that is, 65 million hectares of unallocated lands): create CUs, indigenous lands or forest concessions; create agrarian reform settlements; or to let these lands be privatised allowing legal deforestation? Regarding the creation of conservation units[88], a key measure of Axis 1, there are currently about 25 million hectares of Federal CUs, 25 million hectares of state CUs[89], and 10 million hectares of indigenous lands[90] set aside in the Amazon. However these are unevenly distributed as well as being subject to continuous intrusion.

Indeed, and because there is a problem of resources needed for compensating people living there (in many cases squatters or illegal title holders), the creation of CUs has tended to occur in more remote, less populated areas distant from agricultural centres while also occurring in light of internationally-visible crises such as the assassination of the American Dorothy Stang in Pará in 2005. Furthermore, negotiation with certain states over creating new CUs has been fraught with difficulty. Mato Grosso is a paradigmatic example here given its agribusiness orientation and it has thus seen practically no new areas created since the implementation of the PPCDAm.

Outside protected areas, controlling deforestation in private holdings remains a key issue, especially in Mato Grosso where most land is now private given the above-mentioned occupation history. Here, ecological-economic zoning (ZEE, decree-law No. 4.297 of 10 July 2002) is one of the main instruments of National Environment Policy while being encouraged under PPCDAm Axis 1. Not

[87] Launched in 2009 (Law 11.952/2009).
[88] An earlier development in Brazilian environmental policy was that of a 'socio-environmental' paradigm that foresees local population's rights to development and the promotion of economic activities, or 'productive conservation', instead of purely green conservation (see Hall, 2000). Hence, the Brazilian National System of Conservation Units (SNUC) includes sustainable development areas where local populations can subsist and maintain their livelihoods. It is worth remembering the role of PT in the development of socio-environmentalism in Brazil, in the late 1980s – a unique trajectory of activism following democratisation, the assassination of Chico Mendes, the struggle of the landless movement, and Brazil hosting the Rio92 Earth Summit. Socio-environmentalism is predicated on a discourse that equals poverty reduction and environmental protection as two sides of the same coin (Hochstetler and Keck, 2007; Acselrad, 2010; Wolford, 2010).
[89] However, there is a general feeling of '*para inglês ver*' or lack of implementation as these units are mostly unprotected due to lack of resources or management plans; many suffer from invasion and deforestation.
[90] Here too, suffering from squatter invasion, deforestation due to the lack of surveillance.

surprisingly, implementation of ZEEs has proven to be a very political issue given the political and economic power of local interests (Hall, 2000). In Mato Grosso, for instance, a zoning plan developed under the *Prodeagro* programme (a state-level natural resource management program financed by the World Bank), so far has not been implemented (see Chapter 8).

In this context, controlling deforestation in private holdings in Mato Grosso has only been possible by relying on Forest Code (FC) provisions. The right to private property is a fundamental right in Brazil's 1988 Constitution (article 5, XXII), but it is 'environmentally qualified' (articles 170, VI and 186, II), that is, its social function has an environmental dimension controlled by the nation-state. The full right to exploit, respecting neighbours' rights, became the right to exploit only when human health and essential ecological processes are respected. Furthermore, Agrarian Policy Law from 1991 explicitly conferred on private landholders a duty to comply with the legal reserve requirement of the FC.

The first version of the FC dates from 1934, establishing that owners maintain 'protection forests'[91], while in 1965 the code was altered and determined that a 'Legal Reserve' (LR), or set-aside, should constitute 50% of lands in the Legal Amazon and 20% elsewhere, as well as defining Permanent Preservation Areas (APPs), e.g. on river margins and by water sources. In 1996 a Temporary Measure[92] was approved increasing the LR in forested areas in the Legal Amazon to 80%. And yet, the 2012 reform of the FC[93] established a minimum property size[94] below which property holders are not obliged to recover LR, even as it removed the obligation to pay fines levied on landholders who had cleared forest prior to 2008[95].

The FC has been in general widely ignored, with successive changes leading to a lack of definition, lack of oversight, and inefficient law enforcement, with deforestation crimes mainly not fully tackled (Stickler et al., 2013). Hence Axis 2 of the PPCDAm brought a new emphasis to FC compliance, foreseeing the improvement of monitoring and policing of illegal deforestation, and comprising an 'old style' set of command and control measures. Actions are integrated between the National Institute for Space Research (INPE) with satellite monitoring of deforestation, and Ibama, resulting in fines and sometimes arrests when illegal deforestation occurs.

[91] Decree 23.793 of 23 January 1934.
[92] MP 1.511 of 25 July 1996.
[93] Law 12.727 of 17 October 2012.
[94] Four 'fiscal modules'. The size of one fiscal module varies according to the municipality. In Case Study 1 Nova Ubiratã, for instance, it is 90 hectares.
[95] This choice of the year 2008 is due to Decree-law 6.514 of 22 July 2008, adopted to regulate the Environmental Crimes Law of 1998, notably by establishing the system of infractions and fines.

Two main systems of satellite monitoring are used. The PRODES has been used since 1988 to identify the broad areas of deforestation, and enables calculation of annual rates of deforestation. It remains the main system informing governmental strategies. The other system is DETER, which was created in 2004; it is a real-time system, inputting data every day thus allowing for swift control and punitive actions. It is hence now possible to know in real-time 'where' deforestation is occurring and, with the advent of the geo-referenced rural registry (the CAR)[96], 'who' has deforested, thus enabling rapid surveillance and enforcement actions. The integration of actions in crime investigation by sharing information with different entities, the use of intelligence, the coordination between the army, federal police and Ibama has helped law enforcement, notably through 'ostensive' operations aimed at psychologically deterring deforestation.

The *panopticon* was therefore set; the Brazilian federal state was seemingly in a place where it could know everything that was going on in the Amazon. The question was, could it indeed act everywhere so as to avoid deforestation and its 'driving forces'? Furthermore, given that farmers can legally clear at least 20% of their properties in the Legal Amazon, finding sustainable economic alternatives may be the only deterrence to legal deforestation – and Mato Grosso has only pledged to zero illegal deforestation by 2020 in its deforestation control plan.

Axis 3 of the PPCDAm was thought to help with that: sustainable economic alternatives, payments for ecosystem services, sectorial agreements (with the beef, wood or soya sectors) and 'low carbon' agriculture with techniques that produce lower GHG emissions. The *Fundo Amazônia*[97] has a key role here, capturing resources for projects that promote the conservation and sustainable use of forests. Depending on what is analysed – farmers in commodity monoculture production or traditional populations living from the forest - Axis 3 has different connotations. Regarding the former, it could be considered a neoliberal effort to avoid a more destructive capitalist expansion in the region, in effect, a reflection of the impossibility of the Federal State ever fully controlling the Amazon. To a certain extent it could be seen as a failure of the *panopticon vis-à-vis* the strong forces of agribusiness and the dynamics surrounding its expansion (see Chapter 8). As for the latter, it can be seen as a crucial effort to sustain traditional populations' livelihoods in the forest.

[96] After a Mato Grosso experience with the Rural Environmental Registry (CAR), a similar registry is being implemented at the Federal level (see Chapter 8).
[97] Managed by the BNDES, the *Fundo Amazônia* is financed by donations, notably from the Norwegian and German governments and from Petrobras.

Meanwhile, and complementing PPCDAm, another important deforestation policy is the List of Priority Municipalities (*Lista de Municípios Prioritários*), a sort of black list of the municipalities with the worst deforestation trends (Decree-Law 6.321 from 21 December 2007)[98]. Those on the list are prioritised as the locus of action for PPCDAm's three axes, with sanctions, such as the blocking of deforestation permits or the embargo of rural credit for rural properties. A further policy deterring deforestation, especially in the commodity oriented agriculture frontier, is the decision in 2008 to couple access to rural credit in the Amazon biome with fulfilment of laws concerning deforestation[99].

Amazon deforestation control is therefore made up of a complex and evolving web of policies and governmental agencies. Overall, the preceding has highlighted the various hurdles confronting these policies. In the particular case of Mato Grosso, for instance, the challenge is to control deforestation in private holdings, given the widespread privatisation that has already occurred in that state. Next, we turn to the matter of biofuel policies which are a central concern of this PhD.

4.3 Biofuel policies

Biofuel policies regulate the production and sale of biodiesel and ethanol while serving a series of economic, social, environmental and energy security objectives. Key actors include the Ministry of Mines and Energy (MME, responsible for energy planning), the National Petroleum Agency (ANP, in charge of monitoring the oil sector and regulating, licensing and ensuring compliance), and state-controlled Petrobras, which dominates Brazil's oil sector with 7,000 service stations while producing ethanol and biodiesel via its subsidiary *Petrobras biocombustíveis*[100]. The following discussion now looks at biodiesel and ethanol in more detail.

4.3.1 The National Programme for the Production of Biodiesel (PNPB)

The National Programme for the Production of Biodiesel (PNPB) was officially launched in December 2004, establishing a 2% mix of biodiesel in diesel to be sold in the country between 2008 and 2012, and a 5% mix thereafter[101]. In reality, the latter figure was met by 1 January 2010 and the blend is currently set at 7%[102].

[98] Municipalities are included on the list according to the following factors: total deforested area in the municipality; total deforested area in the last three years; and increase of the deforestation rate in at least three of the last five years.
[99] Central Bank of Brazil (BACEN) resolution number 3.545/2008. This applies to the national system of rural credit, and hence to commercial banks providing credit lines to farmers.
[100] Petrobras website, http://www.petrobras.com.br, accessed 20 May 2013.
[101] Law 11.097 of 13 January 2005.
[102] Law 13.033 of 24 September 2014.

Besides the MME and Petrobras (the sole buyer of biodiesel and responsible for its incorporation in the diesel blend), the Brazil Chief of Staff (the *Casa Civil*) and the MDA have key roles in biodiesel policy. While the former coordinates action among ministries, the latter manages the social objectives of the PNPB and organises biodiesel producing regions in Biodiesel Production Poles (*Pólos de Produção de Biodiesel)*. These poles are intended to foster production by bridging the gap between industry and social movements and promoting the participation of family farmers.

The sector's industry representatives meanwhile are the Brazilian Biodiesel and Bio-jetfuel Union (Ubrabio), the Association of Biodiesel Producers of Brazil (Aprobio) and the Brazilian Vegetable Oil Industries Association (Abiove). The total installed capacity in the 68 industrial units authorised by ANP across the country is now above 7,000,000m^3 (ANP 2013), that is, double the current production level (see Figure 4.4).

The social inclusion component was established through a tributary model that favours the participation of family farming in the agro-industrial chain, especially in the poorer North and Northeast regions. The *Selo Combustível Social* (social fuel stamp) was therefore created. This is a certificate granted by the MDA to the industrial producer of biodiesel that fulfils social criteria such as technical assistance to farmers and acquisition of minimum values of raw material from family farming (15% in Mato Grosso), through contracts negotiated with the participation of unions (Campos and Carmélio, 2009).

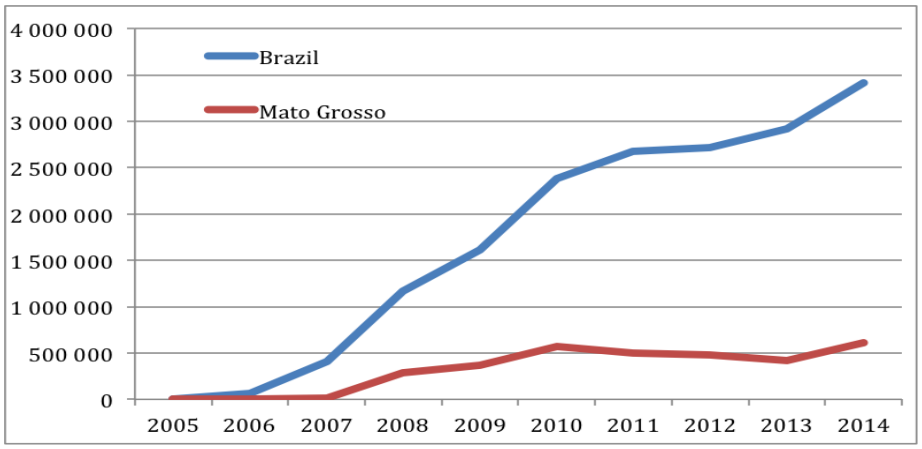
A system of auctions was created that is controlled by the ANP. During the auction companies with the social stamp can dispute the larger slots to be bought by Petrobras (Rio, 2011). Besides this more advantageous participation in the auctions, biodiesel producers with the social stamp have access to better credit conditions and are entitled to the lowering of some taxes[103], according to the crop and geographic location[104] (Campos and Carmélio, 2009; La Rovere et al., 2011).

Family farmers can participate in the social stamp system individually or through cooperatives. In order to benefit from this programme, they must prove they fit in the 'family farming' category by presenting a *Declaração de Aptidão* (DAP), conceded to those who fit the following criteria: residence in the property or nearby locality; ownership of up to four 'fiscal modules' (that is, 360 hectares in

[103] Notably the PIS/ COFINS and CIDE.
[104] Decree 5.297 of 6 December 2004 and Decree 6.458 of 14 May 2008.

Mato Grosso); the production is predominantly based upon family labour; at least 50% of family revenue results from the holding; and the gross annual family revenue is below US$ 96,220 (R$ 360,000). With a DAP, farmers can also have access to the credit lines of the National Programme for the Strengthening of Family Farming (PRONAF)[105].

Figure 4.4 Biodiesel sold in ANP auctions, in m^3.



Source: ANP, 2015.

The swift integration of the soy production chain delivered results, with biodiesel production in Brazil increasing from below 500,000m^3 in 2007 to almost 3,500,000m^3 in 2014 (see Figure 4.4). Compared to sunflower, canola or palm, soybean is the crop with the least concentration of oil (18% of the beans) (Lima and Castro, 2010); and hence is not as energy efficient as other crops having low productivity, measured in amount of oil per hectare (Campos and Carmélio, 2009; IPCC, 2012). Nevertheless, soybeans corresponded to 76% of the feedstock supplying biodiesel industry in Brazil in 2015. Furthermore, 43% of the Brazilian production of biodiesel is located in the Centre-West region, where Mato Grosso is located, the stronghold of soybean production[106].

Biodiesel production from soybeans starts with the separation of the meal (protein) from the oil, with the latter being refined and then converted into biodiesel through a process called transesterification[107]. For this to happen soybeans need to be processed in the country instead of

[105] The PRONAF was created by the Federal government in 1995, aiming at integrating the family producers to the agribusiness chain, allowing for the aggregation of more value to their products and proprieties, as well as the modernisation of the productive system and the professionalisation of farmers.
[106] Data from Abiove, http://www.abiove.org.br/site/index.php, accessed 5 September 2015.
[107] A chemical process in which vegetable oil (in this case soybean oil) reacts with an active product (resulting from the reaction of ethanol or methane with a base). The resulting products are biodiesel, glycerine and an alcohol mixture that is re-processed (Castro et al., 2010). In general, one tonne of soybeans produces 180L of vegetable oil and 820kg of protein. The vegetable oil then, through transesterification, produces 180L of biodiesel and 179L of glycerine, with the use of 4.7kg of NaOH and 47L of methanol (Lima and Castro, 2010).

being exported raw[108] – the latter case representing 52% of soybeans in 2015[109]. The protein corresponds to 82% of the weight of soybeans and is mostly destined for the animal feedstuff market for the conversion and generation of animal protein, with 50% being then exported.

Soybeans were not initially appropriate to the Brazilian climate but research by Embrapa developed varieties enabling its domestication and its great expansion especially in the Centre-West cerrados. The soils in this region need to have their acidity corrected with the addition of lime. Furthermore, the highly mechanised and large-scale production of soybeans requires the addition of herbicide and fertilisers when sowing the seeds. These are previously inoculated with Nitrogen-fixing bacteria (*Bradyrhizobium* sp). Sowing should happen in October with the beginning of higher rainfall so that ripening and harvest occur when rainfall is lower (February-March), to avoid problems in harvest and lower quality of beans. During the life cycle of the plant there are different applications of insecticides, herbicides and fungicides. Regarding herbicides in particular, the use of GMO soybeans ('soybean RR') resistant to the powerful glyphosate herbicide has enabled an easier management, as before there was the need to use a combination of herbicides (Silva et al., 2010)[110].

After harvesting, the beans must be dried to reduce humidity levels before entering huge storing facilities, the *silos*, generally controlled by the great soybean international traders, with particular facilities so as to maintain air humidity lower than 70% and temperature below 25°C (Silva et al., 2010).

All of these procedures involve large-scale production at huge costs (see Table 4.2). While in 2004 farmers financed about 40% of production, they also resorted to supplementary financing by credit lines, including 30% by commercial banks, controlled by the *Sistema Nacional de Crédito Rural*, with above-mentioned environmental conditionalities. The other 30% came from private credit mechanisms provided by traders (Castro et al., 2010; see also Chapter 7).

[108] In the 2013/14 harvest, Brazil was the world's 2nd producer and exporter of soybeans (after the US). In Embrapa website: https://www.embrapa.br/soja/cultivos/soja1/dados-economicos, accessed 18 August 2015.
[109] Data from Abiove, http://www.abiove.org.br/site/index.php, accessed 5 September 2015.
[110] There are many doubts regarding the safety of this herbicide for human and ecosystems health, see Guyton et al. (2015) and Bonny (2008).

Table 4.2 The cost of soybean production per harvest in an average mechanised holding of the Centre-West region.

Category of expenses		Cost (R$ / hectare)
Operations	Lime correction	
	Sowing and fertilizer application	**Total 260.79**
	Inoculation of seeds	(15.2%)
	Application of agro-chemicals	
	Maintenance of internal roads	
	Harvest	
	Internal transport	
	Auxiliary labour	
Inputs		**total 1,262.19**
		(73.7%)
	fertilizer	636.75
	fuels	179.40
	herbicides	135.80
	fungicides	112.29
	seeds	81.90
	lime	57.00
	insecticides	51.83
Post-harvest costs	Storing	140.18
	External transport	(8.2%)
Other costs	Technical assistance	49.56
	Administrative labour	(2.9%)
	Soil analyses	
Total		**1,712.72**
		(100%)

Source: Silva et al. (2010: 519-520).

4.3.2 Bio-ethanol and the Proálcool

The case of bio-ethanol has a different history. Thus, it can be traced back to the 1970s, and specifically when Brazil was hit hard by the world oil crisis. In 1975, taking advantage of its position as a leading sugar cane (*Saccharum sp.*) producer, the government established the National Alcohol Programme (Proálcool) to promote sugar cane ethanol as a gasoline alternative through production targets, producer subsidies, low-interest loans and guaranteed purchase by the state-owned Petrobras, which blends, stockpiles and distributes gasoline in Brazil (Goldemberg and Guardabassi, 2009; La Rovere et al., 2011).

The Proálcool fostered the opening of new agriculture frontiers for the plantation of sugar cane and consolidated the Southeast region as the leading producer *vis-à-vis* the hitherto hegemonic Northeast (Lehtonen, 2011). The most competitive sugar cane producing region is now São Paulo state and it has been from there that sugar cane production expanded in the 2000s, towards neighbouring states

Minas Gerais, Goiás, Mato Grosso do Sul and Paraná. The Brazilian Sugarcane Industry Association (UNICA) represents 60% of the sugar cane production and processing in the country and its associates are mostly concentrated in the state of São Paulo.

After democratisation and the institution of neoliberal policies (that is, the removal of subsidies) and notably the liberalisation of prices, the sector declined during the 1990s. In the early 2000s, however, improvements in sugar cane and ethanol production technologies as well as economies of scale drove down production costs such that by 2004, ethanol was economically competitive with gasoline without subsidies (La Rovere et al., 2011). The introduction of flex-fuel vehicles (FFV)[111] in 2003 helped here, as Brazil had a well-adapted ethanol infrastructure and distribution network. By 2012 FFVs already corresponded to 17.9 million vehicles or 57% of the light vehicle fleet (UNICA, 2013). FFVs give Brazilian consumers the choice, at the pump (see Figure 4.5), between pure ethanol (hydrous ethanol) and a gasoline blend, which has a mandatory blend of ethanol (anhydrous ethanol) from 18% to 27.5%.

Figure 4.5 A gas filling station in Cuiabá, the capital of Mato Grosso. On the left, prices of gasoline (blended with ethanol), pure ethanol and diesel (blended with biodiesel). On the right, the pure ethanol pump.

Source: the author (May, 2012).

This consumer choice does entail though a limitation on State planning in that foreseeing future increases of the mandatory blend is rendered more complicated. The use of pure ethanol by consumers, for instance, is only advantageous when its price does not go above 70% of that of gasoline, which is more energy efficient, has a better distribution, stability of supply and remains the

[111] A FFV vehicle can run on 100% ethanol, gasoline, or any blend of the two.

cheapest option outside the sugar-ethanol producing regions. Furthermore, Brazilian ethanol can only compete with gasoline when the price of the oil to the barrel does not go below $US 40 (Jank and Nappo, 2009).

Notwithstanding these limitations, the commercial use of ethanol has its internationally most prominent example in Brazil thanks to an adapted infrastructure and developed technology (the FFVs). Not only is Brazil the world's top sugar producer (40.97 million tonnes in 2013/14) (CONAB 2013), and exporter (26.8 million tonnes in 2012/13, accounting for 50% of the world's exports, UNICA, 2013); but also Brazilian ethanol productivity (L/ha/year) is twice as great as, and production costs less than half of, those of the USA (La Rovere et al., 2011). By 2014, Brazil was second only to the US as the world's largest producer of ethanol[112].

Nonetheless, change continues to shape this sector. Thus, as the years of a highly subsidised sector are over, the sugar-ethanol sector benefits from a series of credit lines, especially via the BNDES. This bank has financed more than 90 projects (notably, the extension of plantations and industrial capacity) from 2008 to 2010, at a cost of US$ 5.95 billion[113] (Reporter Brasil, 2011; BNDES, 2013).

A special credit line of the BNDES is Prorenova, notably directed to the regeneration of sugar cane plantations. These undergo a cycle of 6 to 7 years, with productivity progressively decreasing (notably the ATR which is a measure of sugar content), after which the ratoon must be replaced. At the origin of this funding programme was the belief that lack in investments in plantation regeneration may well have been the cause for the sugar cane crisis from 2010 to 2012 (see Chapter 5).

Overall this section has provided background information for the analysis of biofuel policies in the next chapters. It has outlined the origin and evolution of the Brazilian biodiesel and ethanol policies, as well as the actors intervening in each one. Furthermore, it has briefly described the agrarian and industrial specificities of biodiesel and ethanol produced in Brazil, notably from soybeans and sugar cane.

4.4 The case studies

Having provided an overview of deforestation control and biofuel production policies, the chapter can now turn to a brief discussion on the two case studies.

[112] USDA website: http://www.fas.usda.gov/data/us-ethanol-exports-rebound-2014, accessed 26 August 2015.
[113] A cost of R$ 22.6 billion. Exchange rate of 8 December 2015.

4.4.1 Case study 1: Coopertã - soybeans for biodiesel production

The *Cooperativa Agro-Pecuária de Nova Ubiratã* (Coopertã) is a cooperative of farmers founded in 1999 in the municipality of Nova Ubiratã and is now working with the biodiesel industry through the PNPB's social stamp mechanism.

The farmers of Coopertã have their holdings in different districts of Nova Ubiratã. This municipality is part of the greatest soybean production region in the state of Mato Grosso: the Alto Teles Pires region, along the BR163 road (see Figure 3.1). This road - the 'soy highway' - connects Mato Grosso's capital Cuiabá to Santarém in the state of Pará and is an important transport axis for export-commodities, especially soybeans.

Yet, this was previously one of the most inaccessible and unknown regions of Brazil until the mid-20th century, being first explored by the German anthropologist Karl Von den Steinen (1884 to 1887) who established contact with the peoples inhabiting the upper Xingu[114]. The *de facto* colonisation of Nova Ubiratã started in 1952 when the Vargas government conceded 400,000 hectares of land on the left margin of the Ferro River to Japanese immigrants, even though this enterprise eventually failed (Beuter, 2000).

It was only in the 1970s, following construction of the BR163, that a significant influx of migrants occurred, mainly coming from the southern states and attracted by the INCRA official agrarian reform settlements scheme, as well as private colonisation projects that made northern Mato Grosso the most important area of private colonisation in Brazil (Coy and Lucker, 1996; Jepson, 2006). With indigenous communities confined to the 'protection' of the Xingu Indigenous Park (PIX) since the 1960s (Garfield, 2004), such settlement developed swiftly, with the help of federal and private resources (Oliveira, 1997; Barrozo 2010).

The expansion of soybeans thereafter, especially in the 1980s, brought about massive deforestation, soil erosion and water pollution (Barrozo, 2010; Zamparoni, 2007; Bernardes, 2007). The landscape is, today, hence composed of large, highly mechanised soybean farms that encompass thousands of hectares each. Deforestation in this region (referred to as the *Pré-Amazônia Matogrossense*, as it is a transition zone between the Cerrado and the Amazon biomes) occurred by clearing Cerrado

[114] The region used to be inhabited by different indigenous peoples such as the Trumai, the Waujá (Waurá), the Kamaiurá, or the Bakairi, just to name a few. Today, the indigenous population of Nova Ubiratã is concentrated in the northeastern tip of the municipality, located inside the PIX (ISA, 2011).

vegetation, expanding to transition areas, and then penetrating the Amazon biome (Zamparoni 2007). Following this ecological gradient, Bernardes (2007) identified a 'consolidated' area of mechanised agriculture centred on the Cerrado biome, with an older history of deforestation involving the municipalities of Nova Mutum, Lucas do Rio Verde, Sorriso, Diamantino, Tapurah and the western parts of Nova Ubiratã.

Being in the Amazon-Cerrado biome transition area, Nova Ubiratã was once covered with different kinds of forest formations (notably semi-deciduous forest) that were intensively cleared. According to INPE[115], as of 2013, 34.23% of the municipality had been cleared, with a total accumulated deforestation of 4,345.1km^2, thus ranking 8th among Mato Grosso's most deforested municipalities; as such it has also been on the MMA's priority municipality list since 2008.

'Progress' brought about this transformation and made the cities along the BR163 road (not more than 20 or 30 years old) as they flourished in tandem with soybean production. Nova Mutum, Lucas do Rio Verde, Sorriso and Sinop, for instance, have become regional poles in the agro-industrial and services sectors (Desconsi, 2011). While not being on the BR163, and hence developing later than its counterparts along that road, Nova Ubiratã – which has been a municipality since 1995 - is now a thriving soybean producing centre (see Figure 4.6), as this crop expanded from the neighbouring municipality of Sorriso to the western part of Nova Ubiratã.

Figure 4.6 A view of Nova Ubiratã. On the left, the main avenue in the city centre; on the right a house in one of the secondary roads.

Source: the author (July, 2012).

[115] Based on PRODES, in INPE's website, http://www.dpi.inpe.br/prodesdigital/prodesmunicipal.php, accessed 9 July 2015.

In fact, soybean production is now the most economically important activity in the area accounting for most of the non-permanent crops surface (thus, 267,140 hectares of soy were planted in 2011, an increase from just 160,940 in 2004). Until very recently, the main economic activity of the municipality was logging (128,000m^3 of timber still cut in 2011); cattle ranching, in turn, expanded from 39,619 heads in 2004 to 74,705 in 2012[116].

Like the rest of Mato Grosso, land concentration is very high. One result is a clash between the interests of smaller farmers (some in agrarian reform settlements), represented by the Nova Ubiratã Rural Workers Union (NURWU), and those of the big landowners, represented by the Rural Producers Union.

Meanwhile, along the BR163, several international soybean traders were established from the 1990s (such as ADM, Bunge, Cargill and Dreyfus)[117], some with their own soybean processing units. Powerful national companies, such as Amaggi, Fiagril, Caramuru, Grupal and Cooperbio (located in Cuiabá but buying soybeans from the region) are also present in this area.

The region was, therefore, a 'natural' expansion area for biodiesel. Biodiesel industrial units were hence implemented there during the second half of the 2000s following the PNPB guidance, while being incorporated into the already existing soybean crushing facilities in different ways: some crush, refine and proceed with the transesterification for the production of biodiesel (e.g. Fiagril in Lucas do Rio Verde); others only crush soybeans (e.g. Bunge in Nova Mutum); some only refine soy oil (e.g. Grupal in Sorriso); and other units only process soy oil into biodiesel, through transesterification (e.g. Cooperbio in Cuiabá).

The growing importance of the region for biodiesel production was recognised as it became one of the leading national biodiesel poles (*Pólo Medio Norte do Mato Grosso)*. The Pole provides the platform on which the social stamp provisions are negotiated, e.g. the specific compensation for farmers (currently at R$ 1.2 per soybean bag). There, the NURWU and its state-level FETAGRI represent family farmers, while industry is represented by the Biodiesel Industry Union of Mato Grosso (Sindibio). The *Consórcio Alto Teles Pires* located in Sorriso – a decentralised branch of the state

[116] In IBGE's website: http://www.ibge.gov.br/home/estatistica/pesquisas/pesquisa_resultados.php?id_pesquisa=44, accessed 4 September 2015.
[117] According to Sauer and Leite (2012), the share of international capital in the agro-industrial grain processing sector jumped from 16% in 1995 to 57% in 2005.

Rural Development Secretary (Sedraf) – coordinates support to the local implementation and development of biodiesel.

4.4.2 Case study 2: Barralcool - bio-ethanol production from sugar cane

Mato Grosso's sugar cane sector became more prominent at the end of the 20th century, especially following start of the Proálcool programme. Still, it remains of only modest importance in the state's economy, while accounting for only 2.42% of sugar cane produced in Brazil and 3.74% of ethanol production in the 2013/14 harvest (CONAB, 2013).

The main distilleries in Mato Grosso are concentrated in the upper Paraguay river basin, which is in the southwest of the state, comprising Nova Olímpia, Barra do Bugres, Lambari d'Oeste and Mirassol d'Oeste municipalities. Plantations are concentrated around distilleries and have also spread to nearby Tangará da Serra municipality.

These distilling companies are represented by Sindalcool, the Union of Sugar and Ethanol industries of Mato Grosso, created in 1985 and with headquarters in the state capital Cuiabá. This Union encompasses a total of 224,049 hectares of plantations in the 2012/13 harvest (Sindalcool representative, 2012). Its ethanol production is exclusively destined for the internal market (specifically for Mato Grosso, Rondônia, Acre, Amazonas and Pará), while sugar is also exported.

Barralcool is the second biggest distillery in Mato Grosso and produces both ethanol and sugar (see Figure 4.7). It also sells energy resulting from co-generation of sugar cane by-products. Its plantations encompass a total of 35,000 hectares, with 80% of its harvest mechanised. It can process 15,000 tonnes of sugar cane per day and produce 1,250,000L of ethanol daily. It also has an integrated biodiesel unit, enabling a better energy use and complementarities between plant functions, with a capacity of 57,000,000L per year. The company generates 2,500 direct jobs, from which 1,700 are in agriculture and 800 in industry and administration[118].

Barralcool is also a local 'cooperative' of families created in 1980 (its ethanol production started in 1983). These are big farmers of Barra do Bugres who organised the implantation of a distillery; many of them had and still have activities in cattle ranching. Among the founders was Renê Barbour, then one of the biggest cattle ranchers in the entire country, as well as the Petroni, Sansão and Nodari

[118] Data from Barralcool's website: http://www.barralcool.com.br, accessed 12 May 2013.

families. Sugar cane appeared as a means to diversify their activities, providing an opportunity to benefit from government support for the sugar-ethanol sector (Barralcool President, 2012; Schlesinger, 2013). The associated farmers have a production quota that cannot be surpassed and share machinery and labour work (the so-called *condomínio*) during harvest.

The construction of Barralcool brought about significant changes to the municipality's landscape, the latest stage of a longer history of occupation and socio-environmental change. Barra do Bugres (see Figure 4.8) was scarcely populated until the 20th century. The first handful of settlers arrived in 1878 residing where the current urban centre is located and earned a living exploiting the *poaia* (*Carapichea ipecacuanha*), a medicinal plant, as well as tapping rubber[119]. It was not then until the Rondon expeditions[120] in the early 20th century, which enabled a more detailed exploration of this once 'unoccupied' region (Diacon, 2004), that large-scale occupation could commence, following 'pacification' of its indigenous inhabitants, nowadays mostly concentrated in the Umutina indigenous land[121].

Figure 4.7 The Barralcool complex. To the left the biodiesel unit, to the right the storage tanks.

Source: the author (November, 2012).

The creation of Barra do Bugres as a municipality occurred in 1943 as part of this process (see Figure 4.8). In the context of the government-led occupation of the centre-west, official propaganda promoted Barra do Bugres, highlighting the fertility of its lands for coffee as well as the abundance of

[119] Information from IBGE Cidades website: http://www.cidades.ibge.gov.br/xtras/home.php, accessed 30 May 2013.
[120] Several expeditions led by Rondon in the Amazon to build a telegraph line aimed at improving communication with the Amazon region (Diacon, 2004).
[121] This indigenous land comprises 28,000 hectares and is inhabited by people from different ethnic backgrounds: Umutina, Bakairi, Kaiabi, Paresi, Irantxe, Nambikwara, Terena and Bororo. It is a mostly forested reserve in the middle of sugar cane plantations and extensive cattle ranches (Schlesinger 2013).

local water[122]. Conflicts arose between new migrants and the already established settlers as well as remaining indigenous and traditional communities (Barrozo 2008). Yet transformation took place. Thus, a new regional landscape emerged notably based on extensive cattle ranches (Barrozo, 2010).

Following the arrival of the sugar cane industry in the 1980s, cattle gradually ceded space to sugar cane for a while until 1988 when the number of cows grew again[123]. Meanwhile, food production fell as subsistence farmers were progressively displaced (Schlesinger 2013). Some of these farmers used to produce food on the city's outskirts and many ended up joining agrarian reform settlements. The end result has been the concentration of land ownership in the municipality. *Quilombola* communities[124], in turn, are located at quite a distance from sugar cane areas, but were also affected during this era (Schlesinger, 2013).

Figure 4.8 A view of Barra do Bugres. To the right, the bridge over the river Paraguay and the forested Umutina indigenous land.

Source: the author (November, 2012).

Barra do Bugres thus underwent great deforestation in the 20th century because of this succession of the commodity cycles. Although the rate of deforestation has been decreasing since 2001, nonetheless 3,335.6km^2 had been deforested up to 2013 (that is, 55% of the municipality), making it 19th in Mato Grosso's most deforested municipalities[125]. At the same time, other environmental impacts of sugar cane production have been documented by different NGOs (e.g. Formad) including

[122] In the magazine *Brasil-Oeste* (1956), promoting the lands for sale in Mato Grosso and Goiás states (in Barrozo, 2008).
[123] In terms of agricultural crops, sugar cane has an almost exclusive occupation of the territory, with 41,271 hectares in 2011, compared to just 950 hectares of soybeans and 600 hectares of maize, the second and third non-permanent crops. Data from IBGE's website: http://www.ibge.gov.br/home/estatistica/pesquisas/pesquisa_resultados.php?id_pesquisa=44, accessed 4 September 2015.
[124] Communities created by former African slaves. There are four certified *quilombolas* in Barra do Bugres (Fundação Palmares, http://www.palmares.gov.br/?lang=en, accessed 7 September 2015).
[125] PRODES data in INPE's website: http://www.dpi.inpe.br/prodesdigital/prodesmunicipal.php, accessed 4 September 2015.

freshwater pollution, desertification and river erosion, adversely affecting fishing communities and indigenous livelihoods (Schlesinger 2013; Sato et al., 2014).

Thus, here, as with the discussion of the preceding case study, there is a history of settlement violence, extensive deforestation, and economic expansion linked to key national and international crops. The key indicators in this regard for both case studies can be seen in Table 4.3.

Table 4.3 Selected socio-economic and environmental indicators of case studies 1 and 2 municipalities.

	Nova Ubiratã	Barra do Bugres
Surface (km^2)	12,705	6,060
Accumulated deforestation (km^2) and percentage of municipality deforested (2013)	4,345.1 (34%)	3,335.6 (55%)
Population (2014)	10,508	33,365
GDP per capita, in R$ (2012)	67,949	17,508
Human Development Index (2010)	0.669	0.693
Main economic activities	Soybean, logging, cattle	Sugar cane and ethanol, cattle, industry (feedstuff, slaughter houses), services (e.g. Unemat university)

Source of data:

INPE (www.obt.inpe.br/prodes/);
IBGE (http://www.cidades.ibge.gov.br/xtras/home.php);
PNUD Brasil (http://www.pnud.org.br/IDH/DH.aspx).

4.5 Summary

This chapter has provided an overview of key dynamics and places as a necessary background to the four empirical chapters that follow. Thus, it gave an overview of Brazil's and Mato Grosso's political economy, illustrating how successive commodity cycles, from colonial times to the present, have led to destructive and unequal land settlement processes even as they forged society, economy and politics.

Mato Grosso has experienced a very recent, State-led land settlement based on mass migration. This led to privatisation of lands in the Amazon prompting in turn deforestation, further encroachment on

the lives of indigenous peoples, the establishment of extensive cattle ranching and later the development of a vast monoculture of soybeans and sugar cane. In short, it has entailed the development of that state as a major agricultural producer in Brazil.

Yet, widespread deforestation has led to deforestation control measures, such as the PPCDAm (since 2004), designed to regularise land-use in the Amazon, monitor and control deforestation, while promoting sustainable economic alternatives. In the case of Mato Grosso, where there is a particularly high level of deforestation, PPCDAm measures face challenges mainly related to deforestation on private lands.

It was in this context that biodiesel units (fostered by the PNPB) have participated in the social fuel stamp since the mid-2000s by purchasing soybeans from family farmers, as in the case of Coopertã, the cooperative of farmers of Nova Ubiratã that is the first case study. As noted, the cooperative is located in a recently settled region of Mato Grosso that has become an important soybean production zone and where significant deforestation still occurs. Concerning Case Study 2, the ethanol distillery 'Barralcool' was set up in the municipality of Barra do Bugres in the 1980s, following Proálcool's stimuli, bringing sugar cane to the fore in an area once dominated by cattle ranching.

Overall, this chapter has served to underscore many of the complexities involved in understanding the dynamics of social and ecological change in those areas in general, and with an eye to understanding how new concerns and narratives over the environment need to be situated in light of those complexities. To the latter we next turn as the PhD starts to present the collected data.

Chapter 5. **International objectives and domestic political dynamics**

Deforestation control and biofuel development figure prominently in Brazil's external policy. They also constitute mitigation strategies in the Brazilian national climate change regime, even if they pre-existed it. Before heading to the actual mitigation-related contradictions arising as these policies are implemented (in Chapters 6 and 7), this chapter will focus on their role in Brazilian international objectives, namely how they are related to a wider Brazilian natural resource driven geopolitics designed to enhance the country's international stature, thus addressing Research Question 1.

As 'green soft power' tools, deforestation control and biofuel development are important elements of Brazil's rhetoric in international affairs. Yet, on the domestic political stage, competing claims and priorities regarding these policies abound, thus contributing to a gap between what is pledged internationally and domestic implementation.

This chapter will start by contextualising the use of these policies in Brazilian 'development diplomacy'. It will then investigate how Amazon deforestation control became a green soft power tool and how this contributed to a change in the Brazilian position in relation to the UNFCCC, leading to the adoption of voluntary commitments and of the climate change Plan and Policy. The chapter will then explore contrasting domestic views about Amazon protection. Finally, it will analyse the reasoning behind the Brazilian biofuel programmes and their domestic perception, beginning with the more internationally-oriented ethanol production and then moving on to the internal-market oriented biodiesel programme (PNPB).

5.1 Brazilian 'soft power' and 'development diplomacy'

The relatively 'cleaner' energy matrix of Brazil (thanks to biofuel and hydropower) and the 'success' of deforestation control have been part of a narrative that Brazil promotes internationally, a green soft power strategy designed to raise the country's international standing, a key objective in Lula da Silva's diplomatic strategy[126].

While the notion of 'soft power' is itself subject to debate (see Chapter 2), it is nonetheless helpfully used to express non-military power in international relations, exerted through diplomacy and cooperation. Brazil, for instance, has chosen non-confrontational, ideational approaches to the

[126] And continued to a lesser extent by his successor Dilma Rousseff even as Lula da Silva's strategy was more purposeful. Under Dilma Rousseff, there were discontinuities and a focus on the management of the troubled economy.

international advancement that it has sought since independence (Malamud, 2011). Soft power has hence been a key characteristic of Brazil's foreign policy, following the legacy of the Baron of Rio Branco[127] in the early 20th century (Dauvergne and Farias, 2012); indeed, the country has been called a "quintessential soft power" (Sotero and Armijo 2007: 43).

Lula da Silva elaborated this approach. He sought to make Brazil more important internationally by building coalitions especially in the South (Dauvergne and Farias, 2012). While his predecessor Fernando Henrique Cardoso also privileged multilateralism and diplomacy lamenting the outcomes of asymmetrical globalisation, Lula da Silva (and Dilma Rousseff to some extent) was more assertive in challenging global structures hampering development in the South (Lessa, 2010). This view emanated from PT party ideology rather than from the Itamaraty's (Ministry of Foreign Relations) traditional diplomacy, and includes issues such as solidarity among developing countries, reform of capitalist institutions, and reducing the gap between rich and poor nations (Gregory and Almeida, 2008; Dauvergne and Farias, 2012).

In the early 2000s, Brazil advanced a perception of itself as an emerging and dynamic country enjoying significant economic growth. Immense exports to China allowed Brazil to pay down its debt thus helping to improve its international credit rating (Inoue and Vaz, 2012). With political stability and decreasing levels of poverty, the country was more self-confident internationally (Sotero, 2010; Cervo and Lessa, 2014), for instance, asserting its right to a seat on the UN Security Council (Hurrell, 2010). The aspiration was to achieve international recognition according to its self-perception as a "big country" (Lima and Hirst 2006: 21). The 'country of the future' (a widely used expression coined by Stefan Zweig (2014 [1941]), referring to Brazil's perpetually unrealised potential) would hence finally succeed.

'Development' became a key discourse shaping Lula da Silva's foreign policy. Belief in a vast potential for growth already had tremendous political resonance, but with Lula it became a soft power tool in a quest for international prominence. Both Lula da Silva and, to a lesser extent Dilma Rousseff, have sought to translate domestic social and economic success into international power, presenting Brazil as a legitimate and innovative development advocate especially in the South (Dauvergne and Farias, 2012).

[127] This individual is considered the father of Brazil's foreign policy, and is recognised for solving border disputes between Brazil and other South American nations, extending the national territory by 900,000km^2 through diplomacy in the process.

South-South cooperation, development assistance and setting an example on global health issues (e.g. AIDS) became key features of the new strategy (Dauvergne and Neville, 2009; Inoue and Vaz, 2012). Brazil thus disseminated a particular "image of modernity" (Inoue and Vaz, 2012: 528), while also being 'the voice' of the South, notably in WTO negotiations (Hopewell, 2013). This strategy combined a quest for prestige with national and sectorial interests (Gregory and Almeida, 2008; Inoue and Vaz, 2012; Hopewell, 2013). It is not new or exclusive to Brazil, but with Lula da Silva it became more insistent.

One example was the mission to promote key domestic companies[128] as major global players through the support of BNDES (Cervo, 2010; Hochstetler and Montero, 2013). The promotion of Embrapa's agriculture technology, in turn, enhanced the country's interests by opening new markets for its products and services, while promoting Brazilian leadership in Latin America and in Africa (Pino and Leite, 2010; Inoue and Vaz, 2012). Brazil advanced its agribusiness interests in the WTO too, where it claimed to be the 'voice' of the developing world[129].

The environment became an element in the development rhetoric embedded in these soft power efforts. National experiences in biofuel development and deforestation control were represented as 'sustainable development' successes to be widely advertised (Barros-Platiau, 2010; see too Hoeschtetler and Viola, 2011; Dauvergne and Farias, 2012). True, Brazil was already a key player in global environmental policy given its huge forest and water reserves as well as its unrivalled biodiversity. Yet, its 'sustainable development' combining poverty reduction, economic growth and environmental protection was deployed for more international credibility. This model could be exported elsewhere in the South, while a steadfast commitment to environmental protection would increase its stature in the developed world (Vieira and Dalgaard, 2013).

In this respect, Brazil's proactive adoption of voluntary commitments in the framework of the UNFCCC corresponded to a crucial defining moment when the protection of the Amazon became a green soft power tool, as we explore next.

[128] Such as Petrobras, Vale do Rio Doce, Embraer, Odebrecht, Camargo Correia or Votorantim (Cervo, 2010).
[129] As Hopewell (2013) stressed regarding the WTO negotiations, it is uncertain if reducing rich countries agriculture subsidies will contribute to development in poorer countries, as it is Brazil and its agribusiness who stand to capture the greatest gains from the liberalisation of global agriculture markets.

5.2 From infamous deforestation to green soft power tool

Reducing deforestation figures prominently in the Brazilian effort to mitigate climate change. However, as a non-Annex I party to the UNFCCC, it has no obligation to reduce GHG emissions and indeed in the past was always reticent about adopting targets for developing countries. Despite supporting multilateralism and appreciating the importance of the UNFCCC, Brazil was always defensive regarding commitments there. It usually proclaimed instead its sovereignty, avoiding the forest issue entirely, let alone its inclusion in the Kyoto Protocol, seeking refuge in the UNFCCC's 'common but differentiated responsibilities principle' and its need for a development priority (Johnson, 2001; Barros-Platiau, 2010; Hochstetler and Viola, 2011; Carvalho, 2012).

The UNFCCC acceptance of this principle could be seen as a victory by Brazil and other developing countries at the Rio 92 Summit. As José Goldenberg (2012), who was one of the Secretaries of Environment during the Collor administration that organised the summit[130] said, the Itamaraty's stance here was key; Rio 92 nevertheless marked an evolution, as the government had "always been adverse to environmental questions". By linking environment with development, however, the summit enabled Brazil to play a more active role, even as it helped to legitimate Brazil's democratic transition (Barros-Platiau, 2010).

This strategy remained at the centre of the official stance thereafter (Hochstetler and Viola, 2011; Carvalho, 2012; Hurrell and Sengupta, 2012). "Our right to development must not be compromised", said José Israel Vargas, Science and Technology Minister in 1995[131], while Brazilian proposals on GHG emission reduction reinforced the principle of differentiated responsibilities (Brazilian proposal for Kyoto, 1997)[132]. This approach was still evident in recent multilateral contexts, as part of President Lula da Silva's foreign policy on climate (Dauvergne and Farias, 2012): notably, in the 2005 Gleneagles declaration[133]; and in June 2007, in Heiligendamm (Germany)[134] where he stated that

[130] He was Secretary of the Environment from March to July, 1992. Before, he was Secretary of Science and Technology, from 15 March 1990 to 21 August 1991.
[131] MCTI website, http://www.mct.gov.br/index.php/content/view/21284.html, accessed 5 September 2015.
[132] It recognised that developing countries still had less per capita emissions and the temperature change caused by their emissions would only equal industrialised countries in 2147, due to the slow effects of the long term accumulation of GHG in the atmosphere. MCTI website, http://www.mct.gov.br/index.php/content/view/21284.html, accessed 5 September 2015.
[133] Jointly with China, India, Mexico and South Africa.
[134] The Heiligendamm Process began at the 2007 G8 summit recognising that major emerging countries should become key partners in shaping global governance: Brazil, China, India, Mexico and South Africa were invited to participate in the summit.

developed countries "need to assume the responsibility and help clean the planet they have polluted"[135].

So, why the move to adopt voluntary emission reduction targets, as announced at the UNFCCC Conference in Poznan in 2008? Significantly, this change was initiated during Marina Silva's term as Environment Minister (2003-2008) (Hochstetler and Viola, 2011; Viola, 2013). She is an internationally-recognised environmentalist who became an activist in the PT party in the Amazonian state of Acre with Chico Mendes[136] (Nunes and Peña, 2015). By choosing her, Lula da Silva sought to connect to the environmental movement. And her decisive role could not have occurred without his support, for instance by giving her freedom to build her own team in the Ministry (Hochstetler and Viola, 2011; Marina Silva, 2013[137]).

Such support was crucial in changing the balance of power in the Executive, with a relative increase in the power of the Ministry of Environment (the MMA), in relation to the Itamaraty (with its more conservative outlook, see Lisboa, 2002) and the Ministry of Science and Technology (MCTI) – both until then had a crucial say in the UNFCCC negotiations (Hochstetler and Viola, 2011; Carvalho, 2012).

Marina Silva's role in re-defining Brazil's position in the UNFCCC appeared short-lived, as she quit her post in 2008[138], but it cannot be underestimated (MMA official 2, 2013; ISA member, 2013; Formad member, 2012; and Greenpeace member, 2013)[139]. In fact, the results obtained in controlling deforestation (see Figure 5.1) allowed Brazil to perceive its international role differently and resulted from the Amazon Deforestation Prevention and Control Programme (PPCDAm) of 2004/5 (Viola, 2013; Nunes and Pena, 2015). As she said,

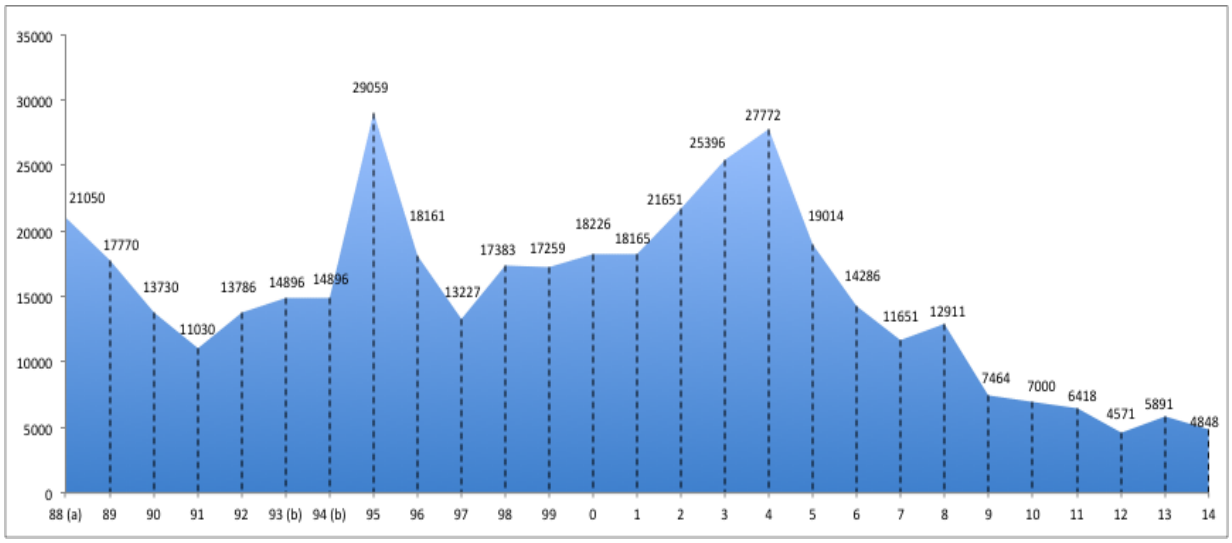
> I think our role is to lead by [giving the] example… and obviously I achieved a reduction in deforestation and a 2 billion tonne reduction of CO_2 which is 14% of all that should be

[135] In *O Estado de S.Paulo*, 19 June 2007: "*Indústria se antecipa ao governo e estimula corte de emissão de CO_2*".
[136] One of the 'martyrs' of the environmental movement in Brazil, this rubber tapper leader from the Amazonian state of Acre was assassinated in 1988, generating worldwide attention and condemnation of Brazil's deforestation in the Amazon.
[137] Marina Silva's speech at José Eli da Veiga's book launch, São Paulo, 16 May 2013.
[138] Due to difficulties in advancing an environmental agenda inside a development-oriented federal government (Nunes and Peña, 2015; Formad members 1 and 2, 2012; ISA member, 2013; UnB Scholar, 2013). Marina Silva then joined the Green Party and ran for President in the 2010 election, gaining 19 million votes. Later she tried to create the *Rede Sustentabilidade* but failed to do so on time for the 2014 Presidential elections. Hence she agreed to run as vice-president of the PSB presidential candidate Eduardo Campos. Following his death in a plane crash before elections, she replaced him as Presidential candidate, obtaining more than 22 million votes in the first round (second round between Dilma Rousseff and Aécio Neves).
[139] While I did not identify that in the interviews, I am aware that opinions about Marina Silva by environmentalists are not unanimous.

reduced until 2014 by all developed countries, this ends up being a relevant homework (Marina Silva, 2013).

The PPCDAm's third phase report stated that its implementation "undoubtedly has a direct relation with the decrease of the deforestation rate" (MMA, 2013: 24) and Hecht (2014) and Nepstad et al. (2014) have also noted the crucial effect of some of its measures while acknowledging a wider set of interrelated factors. The role of the international economic and financial crisis and the falling of international demand for commodities such as beef, soybeans and timber, for instance, may well have contributed (Hall and Branford, 2012). MMA official 2 (2012) also declared that it was still unclear for the government what the reasons behind such a reduction in the deforestation rate were, but he believed the PPCDAm had a crucial role in it.

Figure 5.1 Annual rates of deforestation (August to July of the next year) in the Legal Amazon states, 1988 to 2014, in km^2/year. (a) average between 1977 to 1988; (b) average between 1993 to 1994.



Source: PRODES data in INPE's website, www.obt.inpe.br/prodes/, accessed 7 August 2015.

The PPCDAm itself was the answer to successive increases in the deforestation rate in the Amazon in the early 2000s, especially following a sharp increase in 2003/4. The critical nature of this hike was acknowledged in the PPCDAm decree (MMA et al., 2004).

The Permanent Inter-ministerial Working Group for the Reduction of the Deforestation Rate in the Legal Amazon[140], which launched the PPCDAm in 2004, integrated 15 different ministries under the co-ordination of the Casa Civil[141], which has a greater "conciliation power" - this was perhaps the great innovation of the PPCDAm and a reason for positive results (MMA official 2, 2013). True, there

[140] Presidential Decree of 3 July 2003.
[141] It is now run by the MMA (Decree 7.957, 12 March 2013).

was a series of actions before 2004 aimed at controlling deforestation (e.g. the PPG7). However, the first systematic attempt to integrate policies that resulted in significant deforestation reduction was put down to the PPCDAm[142].

The PPCDAm had an essential role in defining the national climate change policy and the change of stance in international negotiations. Reduced deforestation following its implementation transformed the issue from an infamous embarrassment - the main source of Brazilian GHG emissions and the focus of international scrutiny, mainly regarding the Amazon – to a green soft power tool and a trump card in the UNFCCC negotiations (Barros-Platiau et al., 2012). The 'Achilles heel' of forests was transformed into an opportunity, giving Brazil "a different authority in the international negotiations and showed the country as serious enough to commit to emission reductions" (MMA official 1, 2012).

Besides these positive results, there was a mobilisation of industry, academia and social movements that gave Brazilian negotiators at the UNFCCC new terms of reference (Viola and Hoechstetler, 2011; Marina Silva, 2013; Greenpeace member, 2013). As Marina Silva (2013) remarked, this mobilisation was only possible because the "homework had been done" and "Brazil was leading by example".

However, even she acknowledged this new position was not entirely altruistic. Underpinning voluntary commitments was an understanding that it would not hamper Brazil's economic growth (Marina Silva, 2013) – hence, the recipe for a 'good' external environmental policy was predicated on the absence of bad economic conditions (Lisboa, 2002). Deforestation reduction epitomised this situation, as it seemed to be happening while soybean and cattle production increased and poverty decreased - a clear sign that 'sustainable development' was occurring (Viola, 2013). In fact, as the MMA official 2 (2013) said, Lula da Silva acknowledged that deforestation control was the most immediate way to contribute to climate change mitigation without compromising other economic sectors or targeting consumption. This would have reassured the Itamaraty, always keen to get the most out of the climate regime without hampering Brazil's development (Barros-Platiau, 2010).

As early as 2006, 'forest success' was highlighted by the Brazilian Executive when it released news of initial positive results so that Brazil could take them to the COP in Nairobi in November that year. When the results were announced, Marina Silva said "Brazil, despite not having an obligation to

[142] The Sustainable Amazon Plan (PAS), aiming at encouraging interventions by Amazonian state governments and society as a way to lay the conditions for 'sustainable development' is closely connected to the PPCDAm and was adopted in 2008 with its central concern of fostering regional development.

reduce its GHG emissions, is doing its homework — which is something new" (Marina Silva, 2013). Brazil then changed its forest 'veto' position, finally acknowledging the forest issue in climate negotiations (Barros-Platiau et al., 2012; Viola, 2013).

As the PPCDAm was "already there and showing results", it became key in Brazilian Climate Change Policy (MMA official 2, 2013). But before that Policy was adopted, a Brazilian National Plan on Climate Change was presented at the COP 14 (Poznan, 2008), when Brazil first accepted voluntary commitments. The Plan appeared before the Policy because the "MMA and the President wanted to take to Poznan a Plan that would show the world how Brazil was available to act in practical ways to mitigate climate change", given that other developing countries such as China were moving in the same direction (MMA official 1, 2012).

In the Plan's introduction, Lula da Silva depicts it as one of the world's greatest contributions to climate change mitigation, highlighting efforts already undertaken and Brazil's wish to do more (Brasil, 2008). It presents a win-win-win scenario: 'sustainable development' increases economic growth, reduces poverty and preserves the environment, an "emission trajectory that does not repeat the model of the countries that had already industrialised" (Brazil, 2008: 7). And yet, José Goldemberg (2012) said, "it is not really a plan, but an entanglement of already existing measures"; while according to ISA, "the plan does not present 'additionality', but just a compilation of the initiatives under way"[143].

With no juridical value, and being more general and less ambitious than the climate change policy adopted one year later, the Plan was structured to define the sectors of greater visibility and relevance for climate change mitigation. However, as it was elaborated before the Policy that would sustain it, the Plan represented, in a certain way, an empty effort, as it structured the national regime without pre-determined parameters. Its objective was perhaps more of a political device to take the lead in international negotiations (and MMA officials 1 and 2 concurred), as part of a wider discursive strategy that demonstrated Brazilian 'advances' and 'innovations'. Other interviewees, including governmental officials, found it purely instrumental, stating for instance that the climate change regime was merely a set of "words just to feed conferences, to show-off internationally that Brazil is doing something" (Embrapa official 1, 2012). Furthermore, as the MAPA official (2012) said, it is part

[143] In a 2008 joint statement with other NGOs: "*Sociedade civil quer que governo defina metas de redução de emissões de gases de efeito de estufa"*.

of a “game”; due to international pressure, there needed to be a position “showing that Brazil was growing but with environmental protection and that we were doing it while others weren’t, even if they do not ask us to do it. It contributes to the international image of the country. Instead of suffering criticism, you act”. Indeed, the Itamaraty official (2012) suggested this showcasing of a responsible environmental image was part of the overriding effort to make Brazil more powerful internationally.

In 2009 the National Climate Change Policy (NCCP) was adopted[144], giving weight to the voluntary commitment with a legally mandated GHG emission reduction between 36.1% and 38.9% of national emissions by 2020. The target was based on a ‘deviation from trajectory’ scenario, i.e. the emissions for 2020 were estimated within a ‘business as usual scenario’ - without account for emission reduction policies already in place (such as deforestation control that was already showing results). From these assumptions, an absolute value for 2020 was defined as 3.236 million tonCO_2eq, from which the emission reduction target was to be applied. Contributing to this objective, sectorial plans were established[145] and the PPCDAm was integrated as one of the national instruments of the NCCP, with a target of 80% reduction of the Amazon deforestation rate by 2020, compared with the 1996-2005 average.

Mirroring the 2008 Plan’s reasoning, the NCCP objectives (Art. 4) clearly had to be “in consonance with sustainable development in order to allow for economic growth, poverty eradication and social inequalities reduction”. Visibility given to ‘sustainable development’, meanwhile, which appears in this policy as the main premise, sustains the voluntary and pro-active Brazilian stance.

The policy was adopted days after the 2009 Copenhagen summit (COP15). There, the President had cited Brazil as a good developing country in combatting climate change. This achievement was all the greater as Brazil was a developing country with serious problems to overcome[146].

Since then, Brazil has maintained its two-fold strategy of, on the one hand defending the differentiated responsibilities principle, and on the other proclaiming its success in ‘sustainable development’, notably the deforestation results. This happened for instance in Cancun, in 2010 (COP16)[147], when

[144] Law 12.187 of 29 December 2009.
[145] The decree-law 7.390 of 9 December 2010 established climate change sectorial plans, including a ‘Decennial Energy Expansion Plan’; a ‘Transport Plan’; or the ‘Low Carbon Agriculture Plan’ (ABC) which intends to reduce 133 to 166 million tonnes of Carbon by 2020 with the recuperation of degraded pastureland, the integration of agriculture, cattle, and forestry, and the promotion of direct planting systems.
[146] Speech available at www.cop15.gov.br/en-US/indexe17b.html?page=noticias/pres-lula-speech, accessed 3 April 2013.
[147] And in Durban, in 2011 (COP17) and in Doha, in 2012 (COP18).

Environment Minister Izabella Teixeira hailed her country's achievements in deforestation reduction even suggesting that Brazil had made the biggest contribution to combating climate change in the world.

MMA official 2 (2013) endorsed such grandiose claims:

> The only true expressive contribution [in the climate negotiations] in the last years was Brazil's, the only country who is doing something. Other countries could do a lot but still haven't, they have the power and political strength but haven't done. So Brazil is in a very privileged position in those *fora*… and the Minister will try to capitalise on that. So we have a very clear position that Brazil is showing that it is possible, I think it is a sign Brazil is giving that it is possible to do a lot.

President Dilma Rousseff also drew attention to the Brazilian lead on climate change at a meeting with the Brazilian Forum on Climate Change (FBMC) on 5 June 2013, referring in particular to the reduction in deforestation, stating: "We have shown that it is possible to grow and preserve, to grow and to distribute revenue". The results would:

> give a clear perspective on why we are considered a world reference. Not because we are… A country that preserves the environment only; but, because besides preserving the environment, we deal with some questions that have always been framed as mutually excluding. In many places of the world, growing is contrary to doing it in a sustainable and environmentally correct way[148].

Diverse international organisations have also recognised Brazilian efforts. A report presented at a UNFCCC meeting in Bonn in June 2014 by the Union of Concerned Scientists highlighted Brazil as the country that had reduced deforestation and GHG emissions the most (Boucher et al., 2014). Furthermore, Brazil would have contributed to 50% of the world's forest emission reduction from 2001 to 2015, the FAO revealed, thanks to better forest management and a slowdown in deforestation[149].

Deforestation control has hence become a key tool of international diplomacy, as Brazil has promoted its experience abroad. For instance, this has happened in the framework of the Organisation of the Amazon Cooperation Treaty: "each country can now have a 'control room' of deforestation, using the Brazilian technology", stated a MMA official 2 (2013). *Fundo Amazônia*, in turn, could support projects

[148] Available at http://www2.planalto.gov.br/acompanhe-o-planalto/discursos/discursos-da-presidenta/discurso-da-presidenta-da-republica-dilma-rousseff-na-cerimonia-de-lancamento-dos-planos-setoriais-na-reuniao-do-forum-brasileiro-de-mudancas-climaticas, accessed 4 September 2015.

[149] Data published on the international day of forests, 21 March 2015, ahead of a larger study to be launched by FAO, in http://www.fao.org/news/story/pt/item/281182/icode/, accessed 10 April 2015.

not only in the Brazilian Amazon but also up to 20% could be used to support other biomes and countries with tropical forests. The same official added:

> The Brazilian experience of deforestation reduction has been used and is of interest to other countries in the tropical regions and we have been showing them what we do… We receive all the time invitations to go abroad to showcase our experience. We know there are failures, especially when you look in more detail, but the overall process is very successful, we have been achieving relevant results. That is the big thing we have to show to the world: results! That is what the Minister says, we have results to show, we are not asking for money to build a result, we are building a result and then we ask for support to continue with these strong policies in Brazil (MMA official 2, 2013).

Minister Izabela Teixeira confirmed in Cancun in 2011 that "Brazil was available to share its technological experience in sustainable development with other countries of the South"; and referred in Doha in 2012 to financial mechanisms such as *Fundo Amazônia* having an important role in this regard.

Meanwhile, the Rio+20 meeting held once more in Rio de Janeiro in June 2012, was perhaps the best opportunity to impress the international audience with Brazilian achievements in deforestation control, 'sustainable' technologies and 'sustainable development' generally.

I had the chance to attend the summit and to visit the Athletes Park (across from the Rio Centro, where official negotiations took place), where countries, sub-state authorities, international organisations and private companies could communicate their own experience of 'sustainable development'.

The Brazilian pavilion showcased the country's technology capacity as well as its huge biodiversity stocks. The exhibition highlighted achievements in deforestation control and agriculture, simultaneously increasing food security and making Brazil the 2nd biggest agricultural producer in the world; more win-win-win 'sustainable development'. Important companies such as Vale as well as state-owned Petrobras and BNDES also adopted the 'sustainability mantra' in their exhibitions and on huge publicity hoardings around the negotiation centre.

In the Rio Centro, the MMA distributed a USB disk to delegates with a selection of sustainable best-practice cases in Brazil, and a leaflet explaining Brazil's climate change policy and voluntary approach. Also explained was the relevance of Brazil hosting the summit: "Brazil presents itself as a

benchmark in sustainable development… the strengthening of environmental governance in Brazil allowed important achievements in the Brazilian strategy of development, such as reducing deforestation, expansion of protected areas and sustainable management of natural resources" (MMA, 2012: 1).

In the Rio Centro where negotiations were held, I attended a side event discussing the "Brazilian policy to reduce deforestation: lessons learned, challenges and opportunities for international cooperation". The event was attended by the Brazilian Environment Minister Izabella Teixeira as well as representatives from Germany, Norway, the UN, the World Bank, the Casa Civil and the BNDES — it was an occasion that would prove to be very insightful regarding the complex issue of Amazon deforestation and environmentalism in general in Brazil.

Teixeira began by highlighting the different initiatives and results regarding deforestation control. International guests then praised such success; for example the WB representative said Brazil would be providing an example of decoupling growth from natural resource depletion.

Luciano Coutinho, BNDES representative, thereafter spoke about credit for low carbon agriculture, saying that BNDES wanted to set an example with its sustainability policy, addressing the great challenge of financing sustainable Amazon activities. However, he avoided the subject of the Belo Monte dam (financed by BNDES) that had generated strong criticism from environmentalists. During his speech, young activists (wearing t-shirts with drawings of bloody hands or with Dilma Rousseff with a chainsaw) burst into the room (see Figure 5.2), handing out pamphlets to bemused onlookers. The Minister initially ignored them while they were asked to leave. In the crowded room some people booed, whereas others applauded; a representative from India sitting next to me asked what was going on. An activist then said, in English:

> Please, just a minute, I want to direct this message strictly to foreign people. I wasn't going to say anything, but what is being said now at this table is a lot of lies, false things. They're saying about the Forest Code in Brazil as if it was something good, it's not something good… this table is a lie… this government in terms of environmental policy is totally against the sustainable agenda of the 21th century… No! It's a lie! As you can see the environment has changed in Brazil, it is not satisfying.

The Minister then tried to speak, demanding respect from the protesters for the people inside the room; the protesters replied that there was no respect after hearing what they had just heard, declaring “our government is not protecting our people. They do not protect the Amazon rainforest. Rio+20, this room, it is all a lie, it is ‘bullshit’ for people to see”.

Figure 5.2 An activist interrupts a deforestation control event organised by Brazil during Rio+20.

Source: the author (June, 2012).

Teixeira then defended Brazilian achievements saying that “if the country was a liar, maybe it wouldn’t have the lowest deforestation rate… and this effort is also my effort and of all those present in this room… there are people here that even before you were born were already fighting for the conservation of tropical forests in this country”.

Visibly excited, she then called for environmentalists to work together and stressed the need to elect more ‘green’ parliamentarians so that “we” could better defend the environment:

> We have a challenge of going together, we are few compared to the contrary interests, we have to work together… Let me say something to you, I am a career Ibama official and before you continue yelling, I yell, I yell! And I want to ask that you come together with us at the Environment Ministry, do not be against us because we are already very few compared to the others [who are against conserving the environment].

Behind the rhetoric, then, the 'real Brazil' is a stage of struggles. The difficulties outlined by both the protesters and the Minister herself in advancing an environmental agenda are just one example. Can the 'successful' Amazon promoted internationally be taken for granted? Considering that State and non-State actors reveal sometimes quite different perceptions on the ground for conservation let alone the most appropriate way to carry it out, the future success of the PPCDAm is uncertain. To what extent is the deforestation issue a priority?

Next, I look at the domestic political struggles surrounding the deforestation reduction issue. Such struggles reveal a mismatch between international pledges and national implementation while shaping the local dynamics depicted in Chapter 8.

5.3 Domestic challenges to green soft power

Brazil has indeed achieved a significant reduction in Amazon deforestation, but recent trends (a hike in deforestation in 2013/14) and policy developments such as the new Forest Code nonetheless raise serious questions about whether pledged targets will be met. Even if Brazil achieves its 80% deforestation reduction target, doubts have arisen about the post-2020 targets and the role of deforestation control thereto[150]. Internal contradictions in the Brazilian Executive regarding development and conservation cast even more shadows on the ability of Brazil continuing to deploy its green soft power.

As Barros-Platiau (2010: 75) noted, "there is a huge dissonance between Brazilian foreign policy and the domestic ones". The recent reform of the Forest Code, for instance, weakened restrictions on deforestation and thus tended to complicate fulfilment of international commitments (Barros-Platiau et al., 2012; Hall and Branford, 2012; Viola, 2013). Such dissonance could ultimately undermine international respect for Brazil; even at Rio+20 controversy over the new Forest Code was heard, prompting international scepticism.

While a disparity between foreign and domestic policy is not exclusive to Brazil, this country's case is particularly relevant given its outspoken international environmental rhetoric, part of a strategy to gain international prominence, while flagrant contradictions happen at the same time on the ground in the country.

[150] To be better understood after Brazil presents its proposal for the Paris COP in 2015.

It is not difficult to find voices of dissent concerning the international rhetoric. Some parliamentarians in Brasília have doubts concerning the protection of the Amazon. One member of the PT party, for instance, said: “I think we need to discuss better this matter, scientifically… we cannot do things merely for ‘feeling’ or because of a temporary tendency, like ‘oh, now we are going to protect the Amazon’”. He added there were many “theories and pseudo-theories” about the carbon stocks in forests and that “in our society we have green fundamentalists… ‘Talibans’ of the environment who defend the forest without great rationality” (PT parliamentarian, 2012).

There is a wider and deep-rooted resistance in Brazilian society regarding the adoption of international commitments centred on the need to preserve the Amazon, resonating with the above-mentioned differentiated responsibilities principle. Why should Brazil make an effort if other more developed countries do not (Embrapa official 1, 2012; Casa Civil official, 2012)? The Mato Grosso environment secretary also argued that Brazil had gone too far: “what do I get in exchange? They keep on emitting and Brazil continues with low social indicators!” (SEMA secretary, 2012).

In fact, such dissenters reveal a typical grudge against Northern countries who protest against Brazilian deforestation while having destroyed their own forests: “It is very easy for Europe and the USA who have cleared all their forests to come and say now, to finger point our country, and say that we have to protect” (Ubrabio representative, 2012); “In Europe, in fact, there is a great hypocrisy... Europe has already degraded all its forests” (SEMA Secretary, 2012). A representative of the agriculture lobby in Cuiabá (Famato, 2012) concurred: “can you imagine? I took a Lisbon-Faro flight and I didn’t see one single tree, you understand? So we are in a privileged situation but we cannot let other countries who have practically finished with their reserves tell us what to do”. A Biodiesel Front parliamentarian (2012) shared the same feeling: “the international pressure gives the idea that the country is not taking responsibility for environmental preservation. The richer countries have not done their part, so it is not correct that they impose that on us”.

In this respect, Brazilian legislation was seen as “one of the most rigid deforestation policies in the world” (Ubrabio representative, 2012), with no similar protection existing elsewhere (MAPA official, 2012).

This ‘unfair’ treatment was regarded by a CNA representative (2012) as an instrument of trade wars:

> Those who place the environmental priority in the national and international media are other countries and organisations who want to finger point at Brazil. There is in fact a movement and for obvious reasons, Europe will use all its means to slow down Brazilian agricultural development, certainly. And the only thing Europe has to use is the environment... it is a tool, mainly in trade policy because Europe wants to sustain a model, for obvious political, historical, cultural reasons, a model which is inefficient [EU agriculture subsidies].

International environmental concerns, especially from the 1970s, and the related rise of the Amazon as a global issue were hence seen as hampering Brazil's development and its sovereign use of resources (Arnauld de Sartre and Taravella, 2009; Zhouri, 2010), fostering contradictions, visible inside and outside the Brazilian executive.

It is the case that Brazil has responded to international criticism by implementing an Amazon deforestation control programme and subsequently has used its success in limiting deforestation as a soft power tool to enhance international prominence. Domestically, however, long-established geopolitical practices and representations, as well as notions of development help explain a more complex set of political positions, mostly unrecognised internationally but crucial for understanding Brazil's ambiguous situation (Zhouri, 2010).

In fact, the Amazon has long been seen as the ultimate resource frontier, to be exploited for the sake of development and for Brazil's global glory (Velho, 1979; Bunker, 1985; Hecht and Cockburn 1989; Arnauld de Sartre and Taravella, 2009). This outlook underpins centuries-old colonial and postcolonial practices and consequent socio-environmental damage (Arnauld de Sartre and Taravella, 2009; Becker, 2009; Moraes, 2011), as well as geopolitical discourses (Dodds, 1993). The reliance of the Brazilian executive on the 'development needs' of the North/South rhetoric therefore hides an unequal and destructive model of occupation and exploitation (an internal colonialism) that only contributes to further enrich the privileged of Brazil (Zhouri, 2010; Guimarães and Bezerra, 2011; Sauer and Almeida, 2011).

But the 'unlimited resource frontier' view of the Amazon illustrates another important aspect of the Brazilian geopolitical imaginary: the representation of a naturally endowed country with unlimited resources. This constitutes an ever-moving 'frontier' – a continuous territorial expansion process since colonial times (Moraes, 2011) – and an absence of preventive measures to safeguard resources. The

imperative of constant appropriation and use of soil can be considered one of the founding elements of Brazil (Moraes, 2011). The settlement of Brazilian *Amazonia* since the military regime, for instance, was driven by this 'frontier economics' which views the Amazon as an infinite supply of natural resources to fuel development, through devastating cycles of temporary product valorisation in the international market (Bunker, 1985; Hecht and Cockburn, 1989; Hall, 1997; Becker, 2009).

The idea of inexhaustible resources is integral to the national imaginary: from the 'birth certificate' of Brazil - the letter from Admiral Pêro Vaz de Caminha to the King of Portugal D. Manuel I that talks of extensive wood and water resources as well as agricultural potential; to the vision of a country full of natural resources that is central to Brazilian patriotism (e.g. the national anthem as seen in Chapter 1). This imagined community (see Chapter 2) sees bountiful Nature as key to national identity – an 'edenic' motif closely related to the Brazilian *ufanismo*[151], with long historical roots but persisting today (Holanda, 2000 [1959]; Carvalho, 1998; Chauí, 2000; McNee, 2014).

Hence, diverse actors in the agriculture sector unsurprisingly see the Amazon as a frontier. As a CNA representative (2012) said "we cannot discard *a priori* the potential expansion of agriculture in the Amazon without fully studying that possibility"; use of it should not be proscribed because of an insufficiently-studied and controversial carbon stock issue: "we have much to learn and much to discuss about the destiny we will give to our amazing natural resources".

Indeed, the Amazon is seen by many as an area for potential agricultural expansion, given Brazil's key role in global food production. The belief that Brazil is becoming the world's 'bread basket' is shared by state and non-state actors in the agriculture sector (MAPA and Embrapa 1 officials, 2012; CNA and Famato representatives, 2012). As Famato's representative (2012) stated:

> We are talking about 9 billion people in the world by 2050, then we will have to let the planet decide - the world does not want more deforestation but the world wants to eat. So we will get to a moment, a crossroads and then perhaps we will need to break some rules [Amazon protection] at the planet's request.

While Embrapa official 1 (2012) bluntly said:

[151] Popularised in the writings of Afonso Celso, *ufanismo* broadly means a boastful nationalism that highlights the Brazilian potential, its beautiful nature and natural resources. As an exaggerated celebration of Brazil's potential, it has been part of State strategies of national identity building (Carvalho, 1998).

> It is a question of priorities. People talk a lot about the environment because the world is stuffed with food... in the future there will be more food needs and there is no way of feeding humankind without touching the environment... preserving the environment will be a secondary issue.

Even a MAPA official (2012) stated that, while for now there are available lands in Brazil for agricultural expansion,

> In the future when the world is going to demand more food, then it is uncertain, it is another question… I am not hypocritical to say that we will not need to expand agricultural surface in the future, if there is demand, there will be an expansion... what we try to do here at the MAPA is to guide that expansion... but that discourse of holding the expansion, that it must stop, no, it is the market dynamic that is going to say and we cannot predict it.

The Amazon is therefore seemingly predestined to save the world from hunger, offering the possibility of enormous profits for the international-market-oriented agribusiness sector and much less so for the traditional populations who are thereby displaced. Still, that sector uses the rhetoric of development needs to legitimate Amazon production. A CNA representative (2012), for instance, questioned the Forest Code set aside in the Legal Amazon, as "we have 20 million people living in the Amazon, you cannot deny them the right to be part of the productive system, you cannot deny those populations the right to development" (but see more in Chapter 8 why it is relevant to know who exactly these people are).

Notwithstanding the 'development needs' rhetoric, agribusiness and its political arm in the Federal Congress (the Ruralist Front) have been contesting the territorial rights of traditional peoples, especially in the Amazon (Almeida, 2010). This, and the continuing expansion of agribusiness only make agrarian conflicts more acute, as different sorts of farmers, squatters, *quilombolas* and indigenous communities struggle for land (Porto-Gonçalves, 2006; Almeida, 2010; Sauer and Almeida, 2011).

In agribusiness and other sectors there is a prevalent notion that Amazon protection is an obstacle for national development; this notion has particular force given the significant contribution of agriculture to GDP (Barros-Platiau et al., 2012). Thus, it is argued that agribusiness has paid Brazil's foreign debt and applying restraints on the sector would have a corresponding negative effect on the country's budget and social welfare (CNA representative, 2012; Embrapa official 1, 2012). The importance of

agribusiness is acknowledged in the Executive, where neoliberal macroeconomic and trade policies, including privileging agribusiness expansion, have been maintained even though Brazil has been governed by the left-wing PT since 2002 (Hopewell, 2013).

It is not surprising that Dilma Rousseff's relation with agribusiness has been a matter of contestation by socio-environmental movements. The President publicly wooed the sector before and during the 2014 electoral campaign. When she announced the new credit lines for the agriculture sector in 2014/15, on 26 May 2014 (see Figure 5.3), she stated[152]: "There will be no shortage of credit for our producers… our agriculture and livestock sectors are examples of success. We are world leaders in production and export of coffee, sugar and orange juice. We are also the biggest exporters of soya, and beef". Kátia Abreu, then the President of the CNA stated that President Rousseff had always kept the doors open for the agribusiness sector and practically all demands of the sector had been fulfilled in the 2014/15 credit line, highlighting the sensitivity and empathy of the President for the sector[153].

Figure 5.3 Dilma and soybeans. Picture taken during the announcement of the new Safra plan in May 2014.

Source: *Presidência da República,* 2014, in http://economia.ig.com.br/empresas/agronegocio/2014-05-26/agronegocio-tera-mais-de-r-156-bilhoes-para-a-proxima-safra-anuncia-dilma.html

With such presidential favour for agribusiness, the Environment Ministry has become less influential. An MMA official (#2, 2013) acknowledged the inequality between the Agriculture and Environment

[152] Dilma Rousseff announced US$ 41.72 billion (R$ 156.1 billion) in credit for Agribusiness, an increase of 14.17% on 2013/14. Stated at the programme '*Café com a Presidenta'* [Coffee with the President]. In http://economia.ig.com.br/empresas/agronegocio/2014-05-26/agronegocio-tera-mais-de-r-156-bilhoes-para-a-proxima-safra-anuncia-dilma.html.

[153] In: http://www.noticiasagricolas.com.br/noticias/agronegocio/139462-dilma-com-ajuda-de-katia-lanca-plano-safra-para-atrair-votos-do-agronegocio.html#.VLLGOV7TAh8, accessed 2 September 2015.

ministries in terms of funding and how clashing priorities were addressed. There is a "mismatch in political strength between interests that oppose environmental regulation and interests that favour it" (McAllister 2008:3). The MMA official affirmed that:

> You have sometimes oscillations in the government, some ministries stronger that others, some are more fragile - and we are one of the most fragile - sometimes because of priority given by the Presidency, you end up having some governmental directions that culminate in contradictions (MMA official 2, 2013).

The agribusiness sector is indeed well-represented within the State (Hopewell, 2013). The surprising choice of Kátia Abreu as the new Minister of Agriculture – popularly known as the 'Agribusiness Queen' or "Chainsaw Kátia" to environmentalists (Formad member 2, 2012 and ISA member, 2013), a *persona non grata* to the rural social movements within the PT orbit – has deepened the gap between social movements and the Executive. The former considered it a betrayal to the left-wing supporters who notably worked for Dilma Rousseff's re-election first against Marina Silva and then against Aécio Neves, in the 2014 elections[154]. Kátia Abreu is opposed by these groups not only because of her committed stance against agrarian reform and support of agribusiness but also for being one of the main proponents of legislation aimed at reducing rights of traditional peoples, to ease the expansion of agriculture. Furthermore, Abreu's family is connected with allegations of slave labour in her home state of Tocantins[155].

In an interview with *The Guardian* (5 May 2014)[156] she was clearly aware of the current battle against environmentalism, inside and outside the Executive, as well as the political strength of agribusiness:

> Criticism from radical environmentalists is the best form of endorsement... It shows I am on the right track and playing the right role… For many years, environmentalism reached an extreme pitch and we in the agribusiness sector were treated like criminals… In the past, we only exercised economic influence. Now we also have political power… There are many things holding back progress – the environmental issue, the indigenous peoples issue and more.

This progress rhetoric evidenced in Kátia Abreu's interview, is seen to clash with the socio-environmental movement. This is not new in Brazil. It resonates well with PT party developmentalist

[154] In Carta Capital 25/11 2014: http://www.cartacapital.com.br/politica/katia-abreu-aprofunda-o-fosso-entre-agronegocio-e-movimentos-sociais-8807.html, accessed 17 August 2015.
[155] In Carta Capital 25/11 2014, idem.
[156] In http://www.theguardian.com/environment/2014/may/05/brazil-chainsaw-queen-katia-abreu-amazon-deforestation, accessed 17 August 2015.

ideology, and has a parallel in both the military governments and the Vargas regime. In fact, there has been a continuous postcolonial quest for emancipation, based in Western Enlightenment and 'modernity' and in the right of a sovereign exploitation of Brazil's resources and the Amazon in particular (Porto-Gonçalves, 2012b; Lisboa, 2014). Thus, while Brazil denounces the 'neo-colonialism' of the developed countries especially over the Amazon, at the same time it emulates a destructive development model based on the 'Northern' experience that benefits the national elites in a continuous process of internal colonialism (Zhouri, 2010; Guimarães and Bezerra, 2011; Porto-Gonçalves, 2012b).

For their part, environmental NGOs protested against Dilma Rousseff's 'developmentalism' and lamented her lack of environmental sensitivity (Formad member 2, 2012; Greenpeace member, 2013; UnB scholar, 2013). A Formad member 2 (2012), for instance, argued:

> Dilma Rousseff was a key element in Marina da Silva's departure from the government, in her fight inside the executive... the developmentalist and the environmentalist notions were in conflict... and Lula favoured developmentalism, so Marina saw herself defeated and resigned.

Lula da Silva was also depicted as a "developmentalist"; he was also, according to a UnB scholar, an "opportunist" aiming for a "maximisation of power", by building consensus and agreement with individual sectors, including socio-environmentalism, with President Rousseff having a "much narrower developmentalist vision of the world" (UnB scholar, 2013). Lula da Silva had a crucial role in the outcome of the Copenhagen summit, as Sérgio Abranches (2010) noted, in his report of the negotiations. According to the author, Dilma Rousseff was a great hurdle in the negotiation before Lula da Silva's arrival to Copenhagen, defending Brazil's right to emit as a developing country. Lula da Silva, in turn, would not have followed that stance, eventually contributing to the lukewarm achievement of the Copenhagen agreement (Abranches, 2010)[157]. Hall and Branford (2012) in turn have highlighted Rousseff's lack of sympathy for the environmental cause when she was Lula da Silva's Minister of Mines and Energy, being still today a firm supporter of the big development projects in the Amazon, such as hydro dams.

[157] Abranches heard complaints by different members of the Brazilian delegation and noted the way Dilma Rousseff rendered more difficult the work of Brazilian specialists and counsellors (Abranches, 2010).

There is much subjectivism in evaluating the role of particular personalities such as Marina Silva, Lula da Silva or Dilma Rousseff. But when NGOs and scholars refer to President Rousseff's developmentalism they mean a particular ideology. Developmentalism is not a new concept in Brazilian politics, but a renewal of the previous 'Developmental State' (the national-developmentalism), being a 'neo-developmentalism' (Hochstetler and Montero, 2013).

The national-developmentalism paradigm adopted in the 1930s by the Vargas regime contained concepts of centre-periphery, internal market and deterioration of the terms of trade, with State action focusing on the industrialisation of the country and import-substitution (Dauvergne and Farias, 2012).

Neo-developmentalism on the other hand envisions a deeper integration in the global economy with a 'strong State' (including the crucial role of BNDES, e.g. in energy-related spending, Hochstetler and Montero, 2013) to maintain macroeconomic stability and better distribution of capital while consolidating the market as the main provider of wealth, thus not replacing neoliberalism (Hall and Branford, 2012; Morais and Saad-Filho, 2012). Additionally the concept envisages the government as a facilitator of projects related to the commodity markets and the exploitation of natural resources (and consequent accumulation, notably by agribusiness), and its related demand for infrastructure (Hall and Branford, 2012; Porto-Gonçalves, 2012b; Laschefski, 2014)[158]. Adopted mostly from Lula da Silva's mandates, it is not exclusively PT, but shared across party lines (Laschefski, 2014).

This new developmentalism would be a mere apology for power, "nothing more than a parochial effort" to justify modernisation as a solution for the problems of the South (Sampaio Jr., 2012: 672). In fact, by nurturing a Northern-led modernisation, the new developmentalism counter-poses the collective and diverse rights of given groups (e.g. traditional peoples fighting against hydro dams or mining in their territories) against a supposedly higher, over-arching right of the State to pursue development on behalf of the whole country - the 'right to development', from which the State is the protector and promoter (Lisboa, 2014). The environment and traditional peoples' rights are hence depicted as an 'obstacle' to development (Zhouri, 2010; Laschefski, 2011; Porto-Gonçalves, 2012b).

[158] Notably with the *Programa de Aceleração do Crescimento* (PAC) and most recently the announcement of Chinese investments in a railway through the Brazilian Amazon to the Pacific Ocean. The focus on infrastructure programmes was however not a novelty but with precursors in FHC's *Brasil em Ação* in 1996-1999 and *Avança Brasil* in 2000-2003. Furthermore, projects such as the Belo Monte dam come from the military regime times (Zhouri, 2010; Hall and Branford, 2012).

There have been different occasions when this was apparent in Lula da Silva's speeches. For instance when Barralcool biodiesel unit (Case Study 2) was opened in November 2006[159], Lula da Silva stated:

> I am dedicating my time… to try to solve all the barriers that I have with the environment, all the barriers I have with the Public Prosecutor offices, all the barriers with the question of the *quilombolas*, with the question of the Brazilian Indians… to try to prepare a package and send to the Congress… When it is Brazil that is in question, how will we build thermo-electric power plants? From what will we produce energy in this country? People don't want us to use coal, don't want us to build thermo plants, don't want nuclear power plants…

Furthermore, as "the ideology of our times" (Lisboa, 2014: 72), the belief in development corresponds to a pattern of continuous production and consumption, inspired by those of the 'central economies'. After overcoming colonialism, argues Porto-Gonçalves (2012b), the colonial mentality still persisted, as Brazilians would praise urban, industrialised societies, the use of advanced technologies, encouraging greater production and consumption[160]. The PT focus on the stimuli of family consumption would inevitably go hand-in-hand with higher emissions. The change regarding GHG emissions outlook from mostly LULUCF to energy related (e.g. transport, hence the relevance of biofuels)[161], is thus more difficult to tackle as it involves consumption patterns, a discussion explicitly avoided by the (workers party-led) Executive[162]. In this regard, the Formad member 2 (2012) stated:

> On the one hand you have a global discourse on consumption reduction and cleaner energies and on the other the Brazilian developmentalist notion of the benefits of modernity such as the iPad, iPod, iPhone and an overall consumption pattern of the growing affluence of Brazilian society, indicating that it equals quality of life. The developmentalist and the environmentalist discourse are in my opinion incompatible.

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[159] In http://www.biblioteca.presidencia.gov.br/ex-presidentes/luiz-inacio-lula-da-silva/discursos/1o-mandato/2006/2o-semestre/21-11-2006-discurso-do-presidente-da-republica-luiz-inacio-lula-da-silva-na-cerimonia-de-inauguracao-da-unidade-de-biodiesel-da-usina-barralcool, accessed 14 May 2015.

[160] For a more poststructural critique of development see Escobar (1995). Furthermore, see Jessé Souza's (2000) and Tavolaro's (2008) critiques of Brazilian 'modernisation' and its influence in social sciences' approaches to society-environment issues and in the normative-laden domestic 'interpretations' of Brazil.

[161] Notwithstanding the overall reduction of Brazilian GHG emissions, according to the Brazilian Climate Change Observatory, in 23 years (1990-2013) the Brazilian GHG non-LULUCF emissions doubled (greater increases in the energy and agriculture sectors). LULUCF now accounts for only 22% of Brazil's emissions while agriculture accounts for 35% and the energy sector for 32% (MCTI's website, http://www.mct.gov.br/index.php, accessed 30 January 2014). The great reduction in the deforestation rate (already perceived when the targets were pledged) has therefore a crucial role for Brazil to achieve its emission reduciton targets by 2020. Article from the newspaper *O Estado de S.Paulo*, 11 August 2015, http://sustentabilidade.estadao.com.br/noticias/geral,sem-contar-desmatamento--emissoes-do-brasil-dobram-em-23-anos,1742279, accessed 17 August 2015.

[162] A series of government measures aiming at fostering consumption included the promotion of individual car purchases through easy credit, reduced taxes, artificially low prices for gasoline, and even support for the vehicle industry. These have deep implications in the GHG emissions outlook of the transport sector, hence the relevance for the biofuel policies (see section 5.4 and 5.5).

It is in this framework that the sustainable development discourse giving shape to the NCCP, depicted in the previous section, must be understood. Besides all the contradictions of this concept (see Chapter 2), as it was used by Lula da Silva and thereafter, it is predicated on this new developmentalism and the 'right to develop', thus underpinning greater consumption and natural resource (sovereign) exploitation.

It is worth remembering that developmentalism has a link with nationalism, authoritarianism and the sovereign use of the Amazon (for more on the interrelations between these *isms*, see Velho, 1979). As General Golbery Couto e Silva[163] already said: "to struggle to survive requires maximising economic growth" (Couto e Silva, 1967: 13, cited in Dodds, 1993); and that "Brazil at present has only one choice: to become great or perish" (1967: 62). In order to achieve economic growth and internal security, occupation and spatial integration of the Brazilian territory was considered necessary, as well as the re-settlement of poor farmers from agrarian conflict-prone zones, justifying the mega infrastructure projects and occupation in the Amazon of the military dictatorship (Hepple 1986; Hecht and Cockburn, 1989; Hall, 1997; Porto-Gonçalves, 2012a).

These territorial strategies did not just start with the military regime but have a longer history, dating back to colonial times when Portuguese control of the current Brazilian territory took place through a series of strategies enabling it to go beyond the line of the Treaty of Tordesillas (see Chapter 4). And indeed, the first task of the newly independent Brazil was to safeguard sovereignty over the different regions of the previous colony, giving reasoning to the great quest for national unity and national integration ever since.

This was particularly evident in the late 19th and early 20th century with the construction of the nation-state following the Republican revolution of 1890. Notable here are Cândido Rondon's expeditions in Mato Grosso and Rondônia in 1913-14 to build a telegraphic line to connect the Amazon to the rest of the country in which there was already a sense of modernity, national sovereignty, and emancipation (Diacon, 2004). Rondon himself was a Comte's positivist[164], and this ideology deeply shaped his ideas of national integration as well as the 'domestication' of indigenous peoples (Diacon, 2004). This

[163] This General inspired the Vargas and military regimes' geopolitical reasoning on the Amazon, drawing notably on Nazi geopolitical writers for whom the state was seen as an organism (see Hepple, 1992).
[164] Very briefly, this means a development of the positivism philosophy of science into an ideology of how societies should be ruled, and notably creating a secular religion called 'Religion of Humanity'.

ideology also deeply influenced the formation of the Brazilian nation-state, notably figuring in the Brazilian republican flag with the motto *Ordem e Progresso* (Order and Progress) (Carvalho, 2012).

Ideas of modernity and national integration as well as associated territorial strategies have hence been deeply intertwined in Brazilian history, gaining a more explicit authoritarian facet during the military dictatorship. The current Neo-developmentalism undoubtedly evolved in a very different, democratic context after the 1988 constitution, so it is not as overtly authoritarian as in the past - even if a 'difuse authoritarianism' may exist notably in what regards participation in the environmental impact assessment of great infrastructure projects (Hall and Branford, 2012; Laschefski, 2014). However, some old geopolitical discourses legitimating development persist. Closely related to the sovereignty issue is the nationalistic fear of internationalisation of the Amazon which in the past influenced regional development strategies with the famous *Integrar Para Não Entregar* slogan ('to occupy in order not to forfeit') which still subsists in many sectors of Brazilian society (Arnauld de Sartre and Taravella, 2009; Zhouri, 2010; Porto-Gonçalves, 2012a).

It is not surprising then, even after the end of the military dictatorship, that the issue of Amazon sovereignty has, since the beginning of the UNFCCC in 1992, become the 'thorny issue' for Brazil in international negotiations. The issue of forests has materialised as a traditional conception of national sovereignty, particularly within the military, the Itamaraty, as well as the secret services.

In this regard, former Secretary of the Environment José Goldemberg (2012) recognised that, while President Collor saw an opportunity for acquiring a reputation as a "Green President" by hosting the Rio 92 summit, the military view regarding the Amazon was still widespread. As he stated "there was an exacerbated nationalism that if you hosted a climate convention you would provoke very strong foreign pressure". He recalled a "dramatic meeting" where the military argued that "we needed to be very careful with the Amazon" because there was a problem with the Yanomami indigenous reserve, on the border of Brazil with Venezuela (also, see Dreifuss, 2000; Zhouri, 2010). The military "distributed pamphlets supposedly from the USA saying that if a reserve was created it would declare its independence and ask for UN support" (José Goldemberg, 2012; see too Arnauld de Sartre and Taravella, 2009).

Fear of Amazon internationalisation was also pervasive in the agribusiness sector. As the current Minister of Agriculture Kátia Abreu recognised in the above-mentioned interview to *The Guardian*[165], environmentalists, indigenous groups and landless peasants would be working for foreign interests. This is an archetypal example of the typical nationalistic and 'sovereign' stance regarding the Amazon from the time of the military regime (see Chapter 4 for the plans of Amazon colonisation during this period) but which is still widespread in many sectors of Brazilian society. NGOs, social movements, and indigenous peoples are commonly identified as antagonistic to the interests of Brazil (Zhouri, 2010). More than mere obstacles to development, they constitute a new internal threat, as representatives of the interests of developed nations (Arnauld de Sartre and Taravella, 2009; Zhouri, 2010). This was clearly identified in the farmers' anti-foreign and anti-NGO discourses that are considered in Chapter 8.

In fact, defence of national sovereignty via territorial concerns, is one of the most important factors still influencing Brazilian Amazon policies, articulating dangers (both 'internal' and 'external' to the State) and alterity (Dodds, 1993; Arnauld de Sartre and Taravella, 2009). It ignores the diversity of Brazilian society by grouping everyone under the umbrella of the nation-state. This homogenisation facilitates the dichotomy *us* (Brazilians) against *them* (the developed nations) while camouflaging the unequal distribution of wealth and power in Brazil in which indigenous peoples and forest dwellers end up being marginalised and vulnerable to further incursions of their territory (Zhouri, 2010). This construct nurtures military suspicion and helps justify the occupation of the Amazon, depicting its territories as 'empty' and ready for exploitation (Zhouri, 2010; Porto-Gonçalves, 2012a), so "the history of anti-internationalisation narratives can be understood as a way of symbolically nationalising the Amazon in order to colonise it" (Arnauld de Sartre and Taravella, 2009: 413).

While the internationalisation narrative is now being used by both regional oligarchies and the Federal State in a struggle for territorial control in the Amazon (Arnauld de Sartre and Taravella, 2009; see Chapter 8), there has been a marked change in the 'official line' taken by the Brazilian government. As noted, there has been a shift to the current 'sustainable use' of forests narrative. Whether or not this is simple rhetoric, this transformation is to a great extent the result of international pressure and of

[165] In http://www.theguardian.com/environment/2014/may/05/brazil-chainsaw-queen-katia-abreu-amazon-deforestation/print, accessed 23 August 2015.

domestic mobilisation and institutional development since the end of the 1980s (Hall, 1997; Hochstetler and Keck, 2007)[166].

This greener sense of sovereignty was bolstered by the apparatus provided by the PPCDAm and resultant feeling of control of the State over the Amazon, notwithstanding agribusiness protest and counter-strategies for legitimating expansion in the Amazon (see Chapter 8). This new empowerment of the (Federal) State conferred by the positive results of deforestation control seems to have redefined and strengthened the concept of Brazilian sovereignty over the Amazon and enabled the government to dismiss foreign criticism. President Lula da Silva, in a ceremony held in Brasília on 26 October 2006 celebrating the then latest data on deforestation reduction thus noted:

> The Amazon is Brazilian. The sovereign domain over our territory is unquestionable. Those who wish to know the Amazon need to ask us first. Those who wish to explore it need to ask us first. We do not give away the sovereign control of that extraordinary forest reserve[167].

Under the new mantra of sustainability, a geopolitical strategy for the 'emancipation' of Brazil subsists, notably through the sovereign use of its immense natural resources, namely in the Amazon. At the same time, to enhance its positive international prominence, Brazil enacts a green soft power approach in which deforestation control is key, repudiating thereby international criticism or interference in the Amazon. Developmentalism not only gives rise to further deforestation and socio-environmental conflicts, but also internally state and non-state actors diverge on the need to reconsider development strategies because of environmental protection. These ambiguities lie at the centre of the Brazilian soft power contradictions regarding deforestation control.

5.4 Ethanol: a diluted priority?

Biofuels, namely ethanol, had an important part in the country's strategy for higher international prominence during Lula da Silva's terms. During the First National Biofuel Meeting in Brasília, in 2006, he stated:

[166] There was a great influence of foreign environmental thinking and concern with Brazil's environment in the development of environmental institutions and policy, especially following the 1972 UN Conference on Environment and Development, with further developments after democratisation in the 1980s. Nevertheless, it should be noted that there were some home-grown issues (e.g. environmental disasters such as Cubatão in 1984) also contributing to the development of Brazilian environmentalism in general and environmental policy (see Hochstetler and Keck, 2007). Furthermore, Oliveira Vianna, Alberto Torres, Joaquim Nabuco and José Bonifácio were some of the early (19th and early 20th century) Brazilian precursors of the critique to environmental destruction in the country (Pádua, 2002; Tavolaro, 2008).

[167] Library of the Presidency of the Republic, in www.biblioteca.presidencia.gov.br.

> This country has to have an equal dimension to its size… to its importance… to not live the entire life with a colonised mind, depending on someone who looks at us with pity… no one can achieve greatness by thinking small… If we are competent [with the development of sustainable biofuels] certainly the world will have a place reserved for Brazil as an economic and energy power[168].

Here is an example of the postcolonial emancipation discourse previously mentioned, with ethanol now contributing to Brazil's international prominence. The country would also have, according to Lula da Silva, the necessary conditions to develop biofuels, from "innovative technologies", a "strong industrial base", and a "developed agriculture", to the right "natural conditions", and a growing number of family farmers participating in the production chains. The environmental benefit would consist of GHG emission reductions as Brazil would have a "consistent" legislation and a "structured and effective environmental policy", so that un-orderly and irresponsible agriculture expansion would not occur (see more on biofuel land-use claims in Chapter 6), thus legitimating its export and use as GHG emission tool abroad.

This view about ethanol only recently joined the international-oriented rhetoric (Vieira and Dalgaard, 2013). The military government had originally created the Proálcool programme due to energy security fears following the 1970s oil crisis; it had been centred on a support programme for farmers who identified in it a new opportunity of production. As José Goldemberg (2012) observed, "then they were not even close to thinking about climate change, they just wanted to replace coffee or orange for sugar cane and gain money... I have never found one single ethanol producer who had the minimum interest in climate change".

An early indicator of change here was the Agroenergy Plan (MAPA, 2006), which sought both sustainability and competitiveness in agroenergy. This environmental aspect was not only integrated to Brazil's strategy of GHG emission reduction[169], but it also pinpointed a new opportunity based on ethanol exports.

The potential for ethanol becoming an international commodity and Brazil supplying countries wishing to reduce their transport GHG emissions and fossil fuel dependence created an appetite in the

[168] Library of the Presidency of the Republic, in www.biblioteca.presidencia.gov.br.
[169] In the Climate Change Plan ethanol figured as a key GHG emission reduction tool. However, since the NCCP was adopted in 2009 and a Transport sectorial plan was established (estimates an accumulated abatement of 19.5 $MtCO_2$ in 2020 and 49.7 $MtCO_2$ in 2031, in a scenario of implementation of the already existing national logistics plan, compared to a business-as-usual scenario), it remains unclear what the actual role of ethanol in the country's GHG mitigaton strategy is.

Brazilian sugar cane-ethanol sector such that the matter became important in Brazilian diplomacy. Indeed, by 2007 biofuels were largely seen as a solution for both energy security and reducing emissions within the transport sector globally (Sachs, 2007). Europe started to look at ethanol as a viable alternative fuel, and Brazil saw a potential new export market, while the US developed ethanol from its own corn production (Dauvergne and Neville, 2009; Ponte and Daugbjerg, 2015).

In trying to shape an international ethanol market to its comparative advantage, Brazil started promoting ethanol from the early 2000s in bilateral and multilateral agreements (Abramovay, 2008). As noted, ethanol was also a main component of Brazil's 'development diplomacy'. The idea was to turn ethanol into an international commodity by developing supply abroad, notably in developing countries (Ponte, 2014). Ethanol was thus internationally depicted as promoting energy security, mitigating climate change and reducing poverty (Dauvergne and Farias, 2012). Such 'ethanol diplomacy' was implemented in a close coordination with UNICA (the São Paulo-based ethanol producers union) and ICONE, a think tank located in São Paulo committed to the international promotion of Brazilian agribusiness (Hopewell, 2013).

A key Brazilian partner here was the USA (Dauvergne and Neville, 2009). A Brazil-USA ethanol agreement was signed in 2007 designed to contribute to creating an international market of ethanol. The USA was a major player as it had already surpassed Brazil in ethanol production in 2006 and had committed itself to a target of 15% gasoline replacement by alternative fuels. As Marcos Sawaya Jank, then president of ICONE noted in 2007, Brazil could help the USA meet that target by tripling its surface area of sugar cane[170]. Yet, access to the American market remained difficult due to high duties on Brazilian ethanol[171] not changed under the agreement, prompting bilateral tensions. Brazilian ethanol could enter the USA duty-free via Caribbean countries, though (Lima and Gupta, 2013).

While the USA became, in the end, an accessible market for Brazilian ethanol, the European market was another matter. Soon after the initial international biofuel surge, concerns arose over its ultimate benefit as Europeans became more sceptical about biofuels. The EU-Brazil Summit, held on 4 July 2007 in Lisbon, had raised hopes of Brazil satisfying the EU's growing demand for biofuels. A

[170] Article in *O Estado de S.Paulo,* 4 March 2007.
[171] Until 2012 a US$ 0.54/gallon import tariff.

strategic partnership programme was agreed, with a special place in it for biofuels and an international biofuel conference was then held in Brussels[172].

But from 2007 onwards, biofuels started to be seen as flawed. They were associated with an increase in deforestation and poor labour conditions in Brazil on the one hand, and soaring international commodity and food prices on the other (Assis and Zuccarelli, 2007; Dauvergne and Neville, 2009; Wilkinson and Herrera, 2010; Ponte and Daugbjerg, 2015). Brazil fought back with President Da Silva criticising unfair treatment of the Brazilian producers; it offended him to see "fingers soiled with oil and coal" being pointed at his country's ethanol industry[173]. Brazilian authorities and FAO executives argued that the food price crisis was the result of a combination of factors including high oil prices, increased consumption, climate change, low food stock levels, and market speculation. Furthermore, the 'food versus fuel' issue was really about the impact of American corn usage, and not Brazilian practices[174].

If the 'available land' argument was key in dismissing a Brazilian role in the 'fuel versus food' issue, the land question generally remained a concern in Europe, specifically deforestation (direct or indirect) resulting from biofuel expansion (see Chapter 6). If allowed to stand, these concerns would have undermined the previously accepted view that biofuels reduced GHG emissions and indicate that biofuels could affect biodiversity-rich ecosystems (Assis and Zucarelli, 2007).

Here too the Brazilian fightback was emphatic. In the 2008 UNFCCC Poznan conference, for instance, Suzana Kahn, State Secretary of the MMA declared that the government was encouraging ethanol "in a sustainable way, without deforestation or things like that"; Minister of the Environment Carlos Minc added "we will not occupy one hectare of forest for ethanol nor take away one hectare from food production. This will be green ethanol"[175]. Assisted by UNICA and ICONE, Brazilian diplomats closely followed the EU discussions. An Itamaraty official (2012) acknowledged their role was to change the negative image by showing scientifically that concerns were unfounded. The major argument was that sugar cane expansion was occurring thousands of miles away from the Amazon and that most new plantations were on land that was previously pasture (see Chapter 6).

[172] Euractiv, http://www.euractiv.com/, 5 July 2007.
[173] Statement of President Luiz Inácio Lula da Silva at the FAO High-level Conference on Worlds Food Security, Rome, 3 June 2008.
[174] José Graziano da Silva, FAO regional representative for Latin America and Caribbean, in BBC Brasil, 3 June 2008; and Itamaraty official (2012).
[175] Report of the Brazilian side event in Poznan by the Redd-monitor, 23 January 2009 – accessed 29 November 2011, in http://www.redd-monitor.org/2009/01/23/brazils-national-plan-on-climate-change-and-the-amazon-fund.

During the debate on sustainability criteria in the European renewable energy directive, Brazil was deeply involved in bilateral and multilateral moves in Brussels, a sign of the importance given to biofuels and potential exports to the EU market. Brazil's main criticism related to what it saw as 'disproportionate sustainability criteria' operating as an unfair trade barrier preventing Brazil exports. As noted, different state and non-state agricultural actors were equally disgruntled with the EU, perceiving its environmental restrictions as unfair in general, and on ethanol in particular: from parliamentarians (Biodiesel Front parliamentarian, 2012), and the agribusiness lobby in Brasília and Mato Grosso (CNA and Famato representatives, 2012) to government officials at different scales (Itamaraty and MAPA officials, 2012; Embrapa Sinop official, 2012).

Knowing their prices were competitive, Brazil lobbied for the EU target of 10% renewable energy in the transport sector by 2020[176]. Just before the final vote in the European Parliament, Maria Celina de Azevedo Rodrigues, Head of the Brazilian Mission to the European Communities, warned against indiscriminate restrictions on savannah-like areas[177] that "will create a formidable barrier for the expansion of the production of biofuels worldwide, especially in least developed countries"[178].

The European directive was then adopted, with the goal of reaching a minimum 10% share of renewable energy in transport by 2020 in every Member state[179]. The directive sets out sustainability criteria for biofuels[180] and the European Commission has then defined which voluntary certification schemes can be used[181]. This regime whereby a "captive market for sustainability" was created (Ponte, 2014: 265), is a hybrid one in which public and private approaches are intertwined. It would provide a cost-efficient implementation mechanism through private sustainability governance, with the EU thereby avoiding diplomatic and trade issues with producing countries in the South. The global biofuel value chain thus became multipolar, that is away from just hierarchical inter-state activity, and driven instead by leading firms in complex interaction with governments, standard makers, and international NGOs (Bailis and Baka, 2011; Ponte, 2014).

[176] Joint letter dated 1st July 2008 of ambassadors from Brazil, Argentina, Indonesia, Malawi, Malaysia, Mozambique and the RSA, to the European Parliament's Committee on the Environment, Public Health and Food Safety, calling for the confirmation of that target (provided by a Member of the European Parliament).
[177] Such as the Brazilian Cerrado, a high-biodiversity biome however considered by agribusiness and government as the 'natural' expansion area of agriculture (see Chapters 4 and 9).
[178] Letter dated 3rd September 2008 (provided by a Member of the European Parliament).
[179] Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources.
[180] These criteria apply since December 2010 and oblige the EU to ensure that biofuels offer at least 35% carbon savings compared to fossil fuels, this figure rising to 50% as of 2017 and 60% as of 2018.
[181] Since July 19, 2011 the EC has recognised: ISCC, Bonsucro EU, RTRS EU RED, RSB EU RED, 2BSvs, RBSA Greenergy, and others.

Such governance has prompted concerns about legitimacy and authority in the regulative processes, with countries not willing to give up authority over strategic issues (Ponte and Daugjberg, 2015). Main producers such as Brazil and the USA have opposed efforts to scale up the biofuel 'sustainability' issue, for instance at the UN. Instead, they have embraced a neoliberal approach that allows for the protection of their national interests, and promoting unregulated market growth and trade (Lima and Gupta, 2014).

In all of this, the issue of indirect land-use change impacts (iLUC, see Chapter 6) has been side-lined so far. While the Directive did require a report reviewing those impacts, Brazil and other producer countries[182] argued that EU rules for calculating iLUC were illegitimate without an internationally "well-designed and comprehensive methodology", not possible in the short term, thereby using scientific uncertainty to promote business-as-usual (see Chapter 6)[183].

According to an EU delegate in Brasília, transforming ethanol into an international commodity was a priority for Brazil but not for the EU: it was just one of their renewable energy choices (EU delegate, 2012). The EU delegate added that Brazil was very

> Agitated with the EU Directive and its sustainability criteria but they do not necessarily put in risk Brazilian biofuels. Brazil has to answer EU's questions, inform us, assure that indirect impact does not exist, that Brazil is taking measures. Brazil will always complain but it can always export to other countries such as China.

Meanwhile, Brazil continued to push ethanol in the South. Embrapa's tropical experience was touted as a great example for African countries such as Mozambique, including in the biofuel sector. Such knowledge transfer however was not altruism (FGV scholar, 2012). The Africa, Caribean and Pacific (ACP) countries, for instance, have privileged access to the EU, so Brazil hoped to have an easier entry into the EU's market by this route (acknowledged by both EU delegate and Itamaraty official, 2012). As a Casa Civil official (2012) added:

> It has a more geopolitical strategic objective, not only of having more export markets, know-how, Brazilian production technology, but we also see it as a vector of

[182] Including Mozambique, Argentina and Indonesia. They sent a letter to Energy Commissioner Andris Pielbags on 15 December 2009. In Euractiv, 18 December 2009, accessed 17 August 2015: http://www.euractiv.com/energy/brazil-warns-eu-biofuel-sustaina-news-223370.

[183] The report (22 December 2010) acknowledged iLUC could reduce GHG emissions savings but also identified a number of uncertainties associated with available models. On 17 October 2012 the EC published a proposal to limit global land conversion for biofuel production. The use of food-based biofuels to meet the renewable energy target would be reduced from 10% to 5%. As of May 2014, a final decision was pending as the legislative process was on its first reading.

> development for countries situated in the tropical regions in Africa and America which have available cropland, solar radiation, available water resources and a good agricultural aptitude.

Yet, by 2011-12 the sector was in crisis, and had become a lesser international priority even for Brazil. A MAPA official (2012) explained:

> During Lula's government, when he came in 2004, there was some space for that. And it was a very important policy by his government to place biofuels as a factor of change of Brazil's status internationally, based on the replacement of oil. But as time went by, we understood that it wouldn't be that simple to do that. We tried to work with people from Africa and Central America, but we weren't that successful in the short term. But we still believe biofuels have their own space, a very interesting one, but they do not represent a great gain for the country.

Beyond EU difficulties, a series of domestic issues were to blame here. Above all, the discoveries of pre-salt in 2007[184] meant that ethanol became a reduced priority (Sindalcool representative, 2012; Greenpeace member, 2013; FGV scholar, 2012; UnB scholar, 2013). The prospects of oil self-sufficiency and export granted by the pre-salt may indeed be at the origin of the Presidential vetoes to the Climate Change Policy - vetoes to the progressive abandonment of fossil fuels - revealing a continuing attraction to fossil fuels[185].

As a Sindalcool representative (2012) said,

> With pre-salt, all national problems now seem solved: gasoline consumption, education [as royalties would be transferred to education]. They have been discussing for years the royalties distribution but you still don't know exactly how to get to those deep waters, what technology will be used, and which environmental risks it will pose.

Confirmation of the pre-salt reserves provoked a shift in official priorities from the 'green oil' export promise of biofuels to the possibility of fossil fuel self-sufficiency granted by pre-salt reserves. This was reflected in the newly enhanced allocation of funds for pre-salt exploration at the expense of the biofuel sector. As the Greenpeace member (2013) explained:

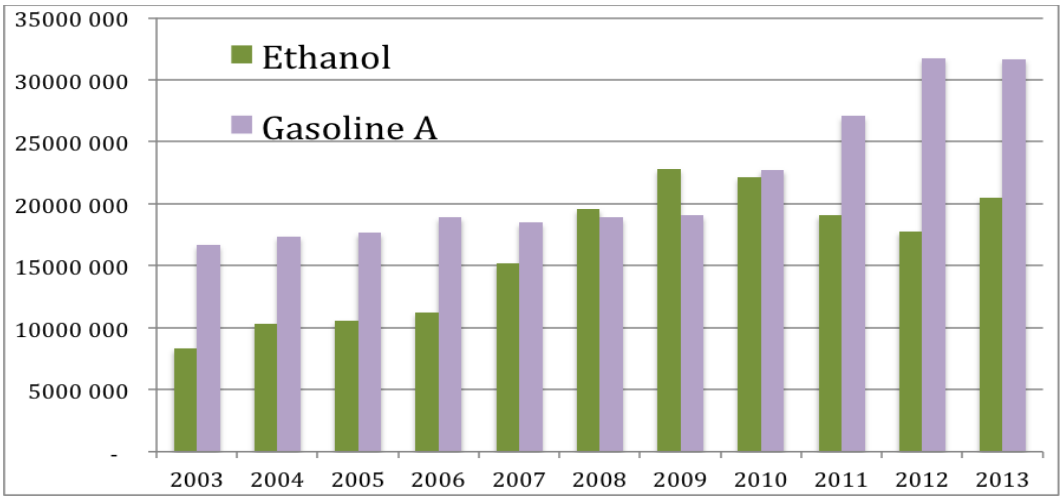
[184] Oil located in the pre-salt layer on the continental shelf off the coast of Brazil. Following the discoveries of pre-salt oil, the oil reserves of Brazil are now estimated at 15.6 billion oil barrels in proven reserves. The ANP has announced that Brazil would double its production in 10 years. In: *Isto É online*, 2 June 2014.

[185] When President Lula da Silva signed the law in January 2010, he vetoed three of its provisions, including: Article 4 III – support for the development and use of clean technologies and the progressive abandonment of the use of fossil fuel energy sources; and Article 10, for reasons of energy security.

> With the announcement of the discovery of the pre-salt reserves it is as if there has been a change of one passion for another, so 'planting oil' became drilling oil… So I think the environmental question of biofuels has gained a new contour in Brazil… this programme started to suffer a new and very strong competition with a conventional form of fuel.

A new question emerged: the choice between fossil fuels and biofuel[186]. Additionally, the conjunction of growing domestic energy consumption and a crisis in the national ethanol industry only worsened the position of this biofuel (Vieira and Dalgaard, 2013). The domestic crisis reflected a lethal combination of a reduced sugar cane harvest, high world sugar prices, and lack of investment in the renovation of plantations, causing a decline in ethanol production from 2010 to 2012 (see Figure 5.4). Indeed, ignominiously, Brazil had to import corn ethanol from the USA while lowering the ethanol blend requirement in gasoline from 25% to 20%. This led to increased gasoline consumption (thus deepening the gasoline import needs as Petrobras refining capacity is limited). With the price of gasoline artificially held so as to not make inflation increase, Petrobras accumulated losses[187].

Figure 5.4 Sales of ethanol and gasoline A (without ethanol) in Brazil, in m^3, from 2003 to 2013.



Source: ANP's website, http://www.anp.gov.br/, accessed 14 May 2015.

Turning ethanol into a Petrobras crisis management tool reflected a short-term, erratic policy that did nothing to help the sector attract new investments (UNICA[188]; Sindalcool representative, 2012; Barralcool President, 2012; FGV scholar, 2012). The fluctuating ethanol policy thus evolves with no

[186] It still remains to be seen if and how the pre-salt reserves will be fully exploited, as the current crisis in Petrobras (see below) has led to a reduction of investments and projects (in Bloomberg, 21 April 2015: www.bloomberg.com/news/articles/2015-04-20/petrobras-scandal-buries-brazilian-prosperity-plan-at-sea, accessed 14 May 2015).

[187] See Bloomberg, 21 April 2015: www.bloomberg.com/news/articles/2015-04-20/petrobras-scandal-buries-brazilian-prosperity-plan-at-sea, accessed 14 May 2015.

[188] In UNICA's website, http://www.unica.com.br, accessed 9 December 2011.

clear production target, let alone GHG emission reduction forecast. More recently, there was a return of the 25% blend (May 2013) which increased domestic demand, and the Brazilian Executive also started a process of correcting gasoline prices, with a 6.6% increase in February 2013 while opting for a tax reduction on ethanol. This could alleviate Petrobras accounts and at the same time avoid a readjustment in the gasoline price in the short term, which would pressure inflation in a context of widespread social unrest. In the 2012/13 harvest the sector seemed to be recovering but doubts remain, as sugar cane seems to be giving way to other crops such as soybeans, in São Paulo and Minas Gerais states and in the Centre-West region, while 80 out of 450 distilleries are inactive[189]. Furthermore, the Petrobras scandal[190] has cast more uncertainty not only about the real prospects of the pre-salt but also on the long-term viability of the ethanol sector and ultimately its GHG reduction potential. In this respect, increasing consumption patterns may well be the factor determining the sector's actual contribution to the Brazilian climate change strategy.

As a Greenpeace member (2013) saw it:

> So now after a big push, creating incentives, pushing for an international commodity and then Brazil reduces the attention to this and plays all the cards in the pre-salt, a conventional exploration with greater GHG production, at the same time promoting consumption and the massive entry of cars in the market and the car industry, with tax reductions and easy credit so as to foster consumption (Greenpeace member, 2013).

Ethanol's GHG mitigation potential was diluted in this context. "We are nowadays clearly with production instability problems in the ethanol sector, and the issues are not guided by climate change", said a MAPA official (2012), while the Mato Grosso SEMA secretary (2012) reminded me that "what determines the use of biofuels is consumption, not climate change".

A series of domestic issues thus complicates the consolidation of ethanol as a clear climate change mitigation instrument. Hence, using the Brazilian ethanol experience as green soft power tool becomes problematic, notably if concerns over social and environmental impacts of sugar cane plantations are considered (see Chapter 6). Furthermore, these domestic problems, combined with international concern over socio-environmental impacts cast doubt on the strategy to make ethanol a

[189] In *O Estado de S. Paulo,* 2 March 2015: "*Cana-de-açúcar cede espaço para outras culturas e até para projetos imobiliários*".
[190] The management team of Petrobras, who had been appointed by the government, was accused of being negligent in a corruption scandal, one of the most 'expensive' to ever affect Brazil. This has worsened Petrobras high debt and plummeted its shares. In Bloomberg, 21 April 2015: www.bloomberg.com/news/articles/2015-04-20/petrobras-scandal-buries-brazilian-prosperity-plan-at-sea, accessed 14 May 2015.

global commodity. Notwithstanding the great natural potential for production and high level of technological development, as well as the concerted effort to promote ethanol abroad, the international geopolitical benefits to be gained from biofuel appears to have been short-lived – or so it seems at this point in time.

5.5 The PNPB and the Brazilian biodiesel experience

In Chapter 5 so far we have analysed how the 'success' of deforestation control and ethanol production became elements of a Brazilian green soft power strategy aimed at increasing the country's international prominence, even as domestic and international challenges cast shadows on its deployment. We now investigate the case of biodiesel, another biofuel in the relatively 'clean' energy matrix of Brazil, which has a much smaller international profile.

At the First National Meeting on biofuels on 30 August 2006 in Brasília, President Lula da Silva highlighted the national potential of biodiesel. It would enable an "energy revolution" that would place Brazil as the world's strongest power in renewable energies, which would be especially important given 'peak' oil, high oil prices and the need to use cleaner fuels. However, targeting the (Northern) world's appetite for sustainable fuels would not hamper Brazil from fully exploiting its own oil resources: "we are going to continue prospecting oil… but now we are also going to 'plant' oil"[191].

Figure 5.5 A biodiesel demonstration unit in the Athletes Park exhibition during Rio+20.

Source: the author (June, 2012).

[191] Library of the Presidency of the Republic, in www.biblioteca.presidencia.gov.br.

An overriding official concern was that of energy security. Biodiesel would help here "as [such security] must be attained using alternative energy sources"; this message was published in English for an international audience to clarify the reasoning of the PNPB (Rodrigues and Accarini, 2007: 164). Brazil could thus grasp the biodiesel opportunity and "consolidate its [international] leadership position in the production and use of renewable energy sources" (Rodrigues and Accarini, 2007: 179). Speaking at the aforementioned opening of the Barralcool biodiesel unit, Lula da Silva added:

> So, I think Brazil is entering a phase of maturity as a sovereign nation. And biodiesel is one of those revolutions… we must not forget that the world cannot compete with Brazil regarding agro-energy; the world cannot compete with Brazil in alcohol production; the world cannot compete with Brazil in biodiesel production. There are bigger territories than Brazil, China… Russia… the USA… But in Alaska, what can you plant there?

The availability and diversity of soil and climate conditions was therefore a "relative advantage" (Rodrigues and Accarini, 2007: 179). In practice, such diverse national conditions has meant that there is a great diversity of oil bearing plants in Brazil, much higher than in most countries (Cesar and Batalha 2010; Embrapa official 2, 2012). When I visited the Embrapa Agro-Energy headquarters in Brasília I learned about the different species whose technological pathways were being developed. Other than the well-known soybean, palm oil, castror bean, *Jathropa*, cotton, or sunflower; there were also being developed other, less known native oil bearing plants: the *babaçu*, *inájá* and *macaúba* palms, but also peanut or *pequi*. Such natural wealth would thus cement the country's leadership position in biodiesel contributing to its emancipation as what Lula da Silva called a "sovereign nation".

A Casa Civil text synthesises the benefits of the PNPB: "a sustainable development programme in the broadest possible sense (environmental, economic, social, technological and strategic)" (Rodrigues and Accarini, 2007: 179). The programme would promote: energy security and diversification; international "leadership" in renewable energies; generation of agrarian income and employment; a reduction of regional disparities; hard currency savings; "benefiting the environment"; and inclusion of poor farmers in the production chain (Rodrigues and Accarini, 2007: 179).

At Rio+20, and with the PNPB already in force, the Brazilian experience was highlighted. When I visited the Athletes Park exhibition centre, I saw a mobile biodiesel unit (see Figure 5.5) and in different pavilions (e.g. the Brazilian government and the Petrobras pavilions) the Brazilian biofuel programmes, including biodiesel, were showcased. There was also an outdoor sign (Figure 5.6)

stating that Rio+20 energy generators run on a 20% biodiesel mix. Clearly, the biofuel experience was on international display, together with the reduction of Amazon deforestation, and the reduction of poverty, as a sign of sustainable development in the country.

Indeed, the biodiesel programme would reinforce Brazil's international role in the climate negotiations, as "Brazil is much better than other countries" in this sector (MDA official, 2013). Industry representatives echoed this view in stressing the need to show internationally this experience and "its strength, as a country… Brazil is the 'buzzword of the moment' [*a bola da vez*]" (Ubrabio representative, 2012).

Initially, the prospects for biodiesel on the international market were promising. Complementing the promotion of ethanol internationally,

> Brazil's diplomatic missions are joining forces in multilateral efforts aimed at creating international markets for biofuels and jointly establishing technical codes and standards for these alternative fuels… [with] the ideal being to make renewable fuels a commodity item, and to enter into bilateral technological cooperation agreements which will contribute toward expanding and consolidating markets for bio-based fuels (Rodrigues and Accarini, 2007: 180).

Figure 5.6 Outdoor sign in the Rio Centro complex where the Rio+20 negotiations were held.

Source: the author (June, 2012).

However, in reality, the international projection of biodiesel was much lower than that of ethanol. The Brazilian biodiesel programme, while often referred to in international *fora*, was much less emphasised than ethanol. Above all, this was due to the fact that Brazilian production was for the

internal market only and hence its export potential was less evident. Industry representatives talked up the latter arguing that production capacity existed (Ubrabio representative, 2012; Biodiesel front parliamentarian, 2012). Yet international trends diminished those aspirations. Thus, the EU decreased its biofuel priority in 2009 raising environmental concerns (a serious matter here since Brazilian biodiesel, mostly produced from soybeans, has a low GHG emission reduction potential, and hence would not satisfy the EU sustainability criteria). As an Abiove representative (2012) said, "the NGOs have won that debate in Europe". Worse, there would be strong competition with Argentinian biodiesel which was taxed less than Brazil's (Abiove and Ubrabio representatives, 2012; MDA official, 2013). The Abiove representative (2012) lamented: "I don't see any economic viability for that today" (Abiove representative, 2012), while the MDA official (2013) specified that taxation and logistical challenges made the export potential low in the near future.

In addition, there have also been significant domestic challenges to the programme further reducing its viability as a 'sustainable development' example. The actual potential to reduce GHG emissions in transport as well as the unclear role of the PNPB in the national climate change plan are cases in point. While there is no clear official statement about its use in GHG mitigation, and notwithstanding its land-use emission contradictions (see Chapters 6 and 7), most industry (Ubrabio representative, 2012; Biodiesel front parliamentarian, 2012) and agriculture representatives (Famato representative, 2012), as well as governmental officials (Casa Civil official, 2012), feel that it is an important one. Other actors were less convinced. The Mato Grosso SEMA secretary, for instance, reminded me that what drove biofuel production was consumption and not climate change targets (SEMA secretary, 2012). MAPA (2012) and MDA (2013) officials echoed this view adding that GHG emission concerns would become even less relevant now that pre-salt reserves were gaining serious attention. Hence, biodiesel production would mostly be seen as a tool for compensating Petrobras for its financial losses (as with ethanol, see previous section) and for energy security (avoiding the imports of diesel). Not surprising, therefore, environmental issues in the PNPB remained poorly articulated (see Chapter 6).

Rather than the environment, the energy security objective was depicted as the main reason for biodiesel development by industry representatives (Biodiesel Front parliamentarian, 2012; Ubrabio representative, 2012) and by a MME official (2012) who also reminded me of the significant

dependence of the country upon diesel due to national dependence on long distance transport by trucks (commodities) and buses (passengers)[192]. Yet even here, the role of biodiesel would be diluted when the pre-salt reserves became available (Casa Civil official, 2012).

In fact, the economic viability of a government-dependent programme was a major concern for some interviewees who pointed out that biodiesel's price was not competitive compared to diesel's which was kept artificially low by government (Embrapa official 1, 2012; CNA representative, 2012; Famato representative, 2012; see also César and Batalha, 2010; Ponte, 2014). Increasing the percentage of biodiesel in the diesel blend would thus have an inflationary effect, this being one of the main reasons for the Executive not going beyond the current blend of 7% (Casa Civil official, 2012; MME official, 2012; Abiove representative, 2012).

The programme would always need the "hand of the government" as it was difficult to compete with raw soybean exports (Embrapa Sinop official, 2012), "someone will have to lose money as it becomes more expensive than oil" (Famato representative, 2012). Nevertheless, the PNPB provided an incentive for crushing soybeans in the country (i.e., separating the protein from the oil part of the bean which would either be used in the food industry or for biodiesel production) instead of exporting them raw. This would increase the 'verticalisation' of the agricultural chain, creating more added value and fostering a growth in and regional diversification of related industries (e.g. feedstuff, poultry) (Aracri, 2011). Here was a matter also of much importance for the Brazilian policy-makers and agriculture and industry representatives I interviewed (MAPA official, 2012; CNA representative, 2012; Embrapa Sinop official, 2012).

In this way, the programme's lack of economic competitiveness would be compensated for by its positive social impacts. However, those impacts were less than anticipated. The PNPB was precisely supposed to learn from past mistakes with ethanol: avoiding geographical concentration, a focus on a single crop, the dominance of agribusiness, and the social exclusion of small-scale farmers (Schaffel et al., 2012; Stattman et al., 2013). Indeed, it was especially designed to enable small-scale farming in less developed regions while encouraging the use of crops better suited for farmers.

For example the castor bean was the great promise for the impoverished Northeast in that its use would promote social development by including family farmers in the production chain. Yet this

[192] Resultantly, diesel corresponds to the highest energy consumption in the transport sector (MME official, 2012).

promise failed to materialise due to: low production rates, technological restrictions of the product process (high viscosity, difficulty in meeting the standards required by ANP), the geographical spread of the family farmers, highly irregular seasons, inefficient technical assistance, the agrarian structure and the high debt of farmers as well as their associated difficulties in obtaining credit (César and Batalha, 2010; Schaffel et al., 2012; Laschefski and Barbosa, 2013; Leite et al., 2013; Stattman and Mol, 2014).

In any event, the rise of soybean as the main feedstock has inevitably cast shadows on this programme's social objective (see more on this in Chapter 7). In the end, the PNPB's implementation was much closer to the ethanol experience (Wilkinson and Herrera, 2010; Stattman et al., 2013). The predominance of soybean as feedstock meant that small-scale production was marginalised, while large-scale farming was encouraged; regional inequalities persisted; the diversity of crops and regional spread was also neglected; and the general preference remained for energy security over socio-environmental sustainability (Hall et al., 2009; Stattman et al., 2013). The use of the PNPB as a sustainable development 'role model' was undermined for these domestic reasons. Thus, domestic contradictions combined with limited external advocacy severely curtail the international deployment of this fuel. There was apparently little green soft power to be had from biodiesel.

5.6 Summary

Chapter 5 has suggested that deforestation control and biofuel development became part of a Brazilian green soft power strategy aimed at increasing the country's international prominence starting with the tenure of President Lula da Silva. While the forest issue had been previously dealt with in a defensive way, the positive results of the PPCDAm meant that Brazil could use deforestation control as an example of its 'sustainable' development thereby advancing its geopolitical position.

But behind the international rhetoric, domestic contradictions soon were revealed among state and non-state actors regarding the need to protect the Amazon and the role of Brazil in the international climate regime. Such dissenting views are rooted in long-standing ideas of development and sovereignty, shaped by geopolitical imaginaries regarding the Amazon, that culminated in the 'environment versus development' perspective.

Biofuel production, and notably ethanol, also became part of Brazil's international green soft power strategy. Bilateral and multilateral diplomatic efforts sought to promote ethanol as a desirable international commodity. This push for ethanol development faded away however. On the one side, there were significant changes in foreign demand, especially in Europe due to socio-environmental concerns there. On the other side, there were domestic problems linked to the ethanol crisis as well as the new relevance of Brazil's pre-salt reserves. Meanwhile, the PNPB was developed with energy security, GHG emission reduction, and social inclusion objectives in mind, but fell short on all counts. Not surprisingly, it achieved little international visibility in Brazil's external campaigns.

Overall, this chapter has illustrated some of the social and political complexities surrounding Brazil's international campaign for political and environmental prominence. Favour has been found but also lost for diverse international and domestic reasons. The chapter also alerted us to the role of domestic tensions and conflicting interests and perceptions – a theme examined in more depth starting in the next chapter.

Chapter 6. **Tackling deforestation in biofuel policies**

After assessing the role of policy rhetoric regarding deforestation control and the 'ecologically beneficial' development of biofuels in the constitution of Brazil's international geopolitics, and with what effects and tensions, in Chapter 5, the following three chapters delve in more detail into the connections and dynamics between these policies at the national and sub-national levels. These two policy streams are central to my core thesis interest, as they both figure prominently in the Brazilian portfolio for climate change mitigation, even if their implementation may lead to contradictions in terms of GHG emission reduction.

Chapter 6 investigates if and how deforestation concerns are included in biofuel policies, Chapter 7 then considers the role and impact of those policies on the ground via two in-depth case studies, while Chapter 8 looks at the effects of deforestation control policies on biofuel feedstock holdings once more with reference to the PhD's two case study areas. The diverse outcomes on the ground, as evidenced by the experience of soybean biodiesel in Nova Ubiratã and sugar cane ethanol in Barra do Bugres, illustrate the nature of the obstacles facing Brazil as it formally works towards implementing national policies while meeting international commitments.

Chapter 6 helps me to address how the biofuel effort is articulated in relation to the country's national and international objectives regarding deforestation control, i.e. RQ 2. It begins by investigating whether biofuel policies accommodate deforestation concerns in light of the views of the different actors who are involved in this sector. In particular, section 6.1 will look at the biodiesel programme (PNPB), while section 6.2 at the ethanol sector and its agro-ecological zoning. The chapter then explores the five main discourses shaping the national discussion on biofuel land-use impacts, which are notably used to justify the absence of deforestation concerns in biofuel policies.

6.1 Biodiesel and the PNPB: absence of environmental provisions

The primary environmental contradiction of the PNPB is its reliance on soybeans which have lower energy efficiency and GHG emission reduction potential than other oil-bearing crops (Rathmann et al., 2012). Moreover, soybean expansion is blamed for much Amazon deforestation (Morton et al., 2006; Wright 2009; Brando et al., 2013). However, and notwithstanding the emission reduction objective of

the PNPB, this programme lacks an environmental conditionality clause to ensure feedstock used is not resulting in deforestation.

Indeed, contrary to the more extensive set of environmental considerations within ethanol production (see below), the PNPB legislation lacks environmental safeguards (Abramovay and Magalhães, 2007; Tocantins and Ribeiro, 2011; Stattman et al., 2013). Ferreira and Ferreira (2010) point to the absence of any legal instrument in the PNPB here. Indeed, they note the National Petrol Agency (ANP) and the National Environmental Council (CONAMA) – the key agencies involved in environmental quality patterns of fuels - have failed to act on this matter.

The implications are significant. Thus, farmers benefitting from the PNPB's social stamp do not have to prove compliance with the Forest Code or that they have an environmental license. As such, they can deforest (illegally) to produce biodiesel feedstock. Furthermore, they can legally clear forest (up to 20% of holdings in the Legal Amazon's forested areas under the Forest Code) but this GHG contradiction, again, is not addressed by the PNPB (for more on deforestation control policy, see Chapter 8). It thus remains uncertain whether feedstock supplying the biodiesel blend is promoting deforestation, and consequently whether the PNPB is really contributing to GHG emission reduction objectives. The exception here is the relatively new (that is, as a biodiesel feedstock) palm oil production, which is subject to agro-ecological zoning. Still, crops such as soybean face no such provisions.

The relative lack of an international dimension to biodiesel plays a clear role here. Thus, while environmental provisions in the ethanol sector are driven by international pressure, biodiesel's domestic focus means that environmental concern is negligible (Casa Civil official, 2012; MAPA official, 2012; MDA official, 2013). Indeed, an official from the Agrarian Development Ministry (MDA) contended that, since the main purpose of the PNPB was to promote social inclusion, the MDA was not responsible for environmental concerns, that is, whether farmers respected environmental law (MDA official, 2013).

And yet, as we saw in Chapter 5, the Programme is at least in theory, a GHG emission mitigation tool. As such, it is politically significant that government officials were so ready to acknowledge environmental lacunae in the PNPB, especially given the clear record of harm done to Amazon forests by soybean cultivation.

Not surprisingly, the biodiesel industry is even less interested in the environment. The representative I interviewed in Mato Grosso (Sindibio) was aware of the absence of environmental provisions but this did not concern the industry. In particular, the lack of environmental licences for rural properties involved in the PNPB was a matter for other institutions. Passing over the role of big landowners and traditional farmers who supply biodiesel, he blamed agrarian reform settlers and the agency in charge of them: “The government needs to solve it, it is not going to be me as a biodiesel producer or the farmer producing soybeans that are going to resolve it, the government needs to give a solution through the INCRA” (Sindibio representative, 2012).

Indeed, various interviewees in Mato Grosso believed environmental conditionalities were unnecessary since the PNPB was in essence 'environmental' (Famato representative, 2012; Sindibio representative, 2012; Embrapa Sinop official, 2012). The agriculture representative, for instance, said, “the environmental question of the PNPB is that instead of using a fossil fuel with a high CO_2 emission, you use renewable energy. Here you have the environmental part of the PNPB: its environmental concept” (Famato representative, 2012).

At the Federal level, however, both MDA and MAPA officials (2012) supported the need for environmental provisions. This was already evidenced by a MDA leaflet from 2010 stating that one of the future challenges of the PNPB was to improve productive systems with sustainability criteria, aiming at controlling the socio-environmental impacts caused by biodiesel production. An MDA official (2013) added that the scope for “socio-environmental” considerations ought to be expanded. And yet, this would require multi-agency coordination. Thus, he stressed that environmental management needed sharing with the MMA.

For its part meanwhile, the MMA stressed the need for dialogue among all intervening parties (MMA climate change secretary, 2012). In particular, analysis was required into the life-cycle of the biodiesel production chain as, "that mode of production with indirect effects and increase of emissions is not in the interest of Brazil". This was a view shared in the Casa Civil (2012). Others even pointed to a future international dimension. Thus, perceived environmental gains across the life cycle would help exports: “we know that there is that preoccupation in the world and if we want to expand and in the future even export biodiesel, I think it is important to do that” (Embrapa Agro-Energy official, 2012).

Yet, this was all in the future. For now, domestic concerns were what mattered, even as the PNPB's key objective of social inclusion helped fragment production, making the transport and logistical issues more "complicated" (e.g. more GHG emissions) - something that had not yet been evaluated in a life cycle analysis (MAPA official, 2012). Carrying out such an analysis would be complicated due to the difficulty of not being able to accurately track soybeans from agricultural holdings (see more on this in Chapter 7).

In a sense, though, these sorts of responses were puzzling, as interventions had already occurred elsewhere. This was the case for sugar cane which had an agro-ecological zoning plan in place (see section 6.2). I asked interviewees why a similar plan was not being considered for the export-orientated soybean crop which would help exert control over its expansion and provide an informative basis for evaluating its impact on the land.

However, agriculture representatives (CNA and Famato representatives, 2012) reacted angrily to my question, declaring that "tough" environmental legislation was already making life difficult for farmers. The MAPA official (2012) asserted that it was not possible for the government to prohibit farmers from planting soybeans, provided they respected the Forest Code: "if he [the farmer] respects the Forest Code allocated areas for production… if he wants to produce in those areas we cannot do anything as a government. If everything is legal, he will be able to produce" (MAPA official, 2012).

He also reminded me that zoning plans, as with sugar cane and palm oil, do not actually prohibit but instead inhibit development by limiting the amount of credit available for new projects within the zoned areas. However, he stated, it was not on the MAPA's plans to implement soybean agro-ecological zoning.

Yet other officials did not agree here. For example, the Casa Civil official (2012) acknowledged a need for soybean zones. He explained that the creation of sugar cane and oil palm zones had required top-level political intervention: "having the funds and willingness to do it, the Executive [can do it]… it does not depend on a legislative authorisation".

Even if the idea of such a zoning plan for soybeans were to gain momentum in some parts of the Federal Executive, Mato Grosso agriculture and industry representatives, government officials and

nation-wide agriculture representatives would be unlikely to concur with this view, as evidenced from the sorts of comments noted above.

Given PNPB's lack of environmental considerations, it remains uncertain whether feedstock supplying the biodiesel blend in Brazil is promoting deforestation, and consequently whether the PNPB is really contributing to GHG emission reduction objectives. Deforestation concerns seem here not to have led to a re-articulation of biofuel narratives, probably because biodiesel is not intended for the international market.

6.2 Sugar cane ethanol: the agro-ecological zoning

The environmental record of the biodiesel case makes the ethanol experience all the more interesting in comparative perspective. Ethanol lacks a specific regulatory framework unlike biodiesel's PNPB, such that the sector operates under fragmented rules (Ferreira and Ferreira, 2010). Environmental provisions remain poorly articulated and are either the result of private voluntary actions coming from within the sector or because of legislation enacted by individual states. And yet, there is, overall, seemingly more of an effort to address the deforestation question.

Funding conditionalities are a prime example of the existing provisions. Following the sugar cane crisis in the late 2000s (see Chapter 5), the Prorenova programme of the BNDES was set up to boost production by supporting the renovation of old sugar cane plantations and the planting of new ones. Another instrument that could potentially discipline land-use by the sugar/ethanol sector is the environmental licensing of industrial units. Indeed, ethanol distilleries operate within a defined area, being relatively easy to identify sugar cane suppliers. However, it has not always been the case that responsibility for the environmental state of suppliers' holdings has been considered in the industrial licensing process, the matter being contested and the focus of court disputes (Irigaray, 2010)[193].

But the real deciding factor is at the state level. The paradigmatic example is the state of São Paulo, noted for operating the most internationally-oriented production system. Here the progression from manual harvest (with the use of fire) to mechanisation has been one of the nationally most successful programmes so far. The private sector's voluntary adherence to environmental programmes is especially significant in São Paulo as, for example, with the Agriculture and Environmental Protocol

[193] Environmental licensing of industrial units is beyond the scope of this thesis, but see Irigaray (2010). This author argues that distilleries should be legally responsible for their suppliers' land use illegalities, particularly since the legal precedent has been established at different court hearings.

for the ethanol/sugar industry, signed by UNICA and the São Paulo state government. UNICA has been a key driver by innovating in a series of corporate green responsibility projects while it has promoted sustainable ethanol abroad (see Chapter 5).

São Paulo and UNICA remain the model nationwide for 'ethanol sustainability'. One important innovation was the São Paulo agro-ecological zoning of sugar cane, with the idea subsequently being adopted by the Federal government.

Hence, the agro-ecological zoning plan or ZAE (Decree No. 6.961) was launched by the Lula da Silva's Executive on 17 September 2009, and it remains the only specific (Federal) policy explicitly tackling land-use issues in the sugar cane sector. The zoning plan itself is a climate and soil study of Brazilian regions designed to direct the 'sustainable' expansion of sugar cane production and investment in the sugar-ethanol sector, establishing rules and directives for expansion with associated credit concessions (CMN Resolution No. 3813/2009). It has mapped the most appropriate lands, excluding areas with native vegetation, in the Amazon and Pantanal biomes, as well as in the high Paraguay River basin, instead directing production to degraded land, cropland and pastureland. More than 34 million hectares were hence identified as having sugar cane potential (see Figure 6.1). MAPA projections indicate that if production were to double by 2017, a maximum of only 1.7% of Brazilian national territory would need to be used (Manzatto et al., 2009).

In effect, though, the ZAE presents the same geopolitical representation of a naturally endowed Brazil depicted in Chapter 5 – namely, an abundance of land from which only a fraction is needed for cultivation. With the help of research and development, this huge resource would enable Brazil to achieve its potential. The ZAE would:

> Enable Brazil to continue to grow without giving away the opportunity to use its natural resources... Besides the technological potential, Brazil also has a lot of land available for plantations. Today we are the biggest producer and exporter of sugar in the world and the second biggest producer of ethanol, using less than 1% of the national territory. But for Brazil, it is not only important to grow but to grow with sustainability, preserving nature. Brazil can produce more and better (Embrapa solos, 2009: 3).

Hence a great expansion could occur over a relatively small territory, while lending a sustainability principle to the process for the benefit of international exports.

Figure 6.1 Sugar cane Agro-Ecological Zoning (ZAE). In yellow are the zoned areas, in green are the areas suitable for expansion.

Source: Embrapa-solos (2009).

Clearly though, the ZAE prevents direct deforestation by setting *a priori* exclusion zones of 'important' biomes such as the Amazon and Pantanal, and by restricting expansion in the other biomes to already used areas (pastureland and cropland) thereby protecting residual native vegetation. Yet the *indirect* impacts of such expansion, i.e., the displacement of cattle and crops such as soybean, are barely stated (see section 6.3).

The MAPA official (2012) acknowledged that expansion was guided towards areas in Goiás, Mato Grosso and Mato Grosso do Sul where soybeans mainly are produced. However, as a state parliamentarian from Sorriso (the main soybean producing centre of the BR163) observed, farmers there are only really prepared to plant soybeans and would thus be very unlikely to convert to sugar cane instead (ALMT parliamentarian 1, 2012). Meanwhile, and given the political and economic power of the soybean sector in Mato Grosso, sugar cane replacement there would be even less likely to happen.

Beyond the substitution issues, the ZAE is rife with ecological deficiencies. Thus it does not intend to close down existing industries or render illegal sugar cane plantations already existing in the Amazon, Pantanal and high Paraguay River basin. Furthermore, it does not prevent farmers from planting in

these excluded areas; rather, it hinders access to rural credit and for sugar/ethanol industrial projects (CMN Resolution No. 3813/2009).

But even potential restrictions do not apply to existing industrial units or plantations (that is, existing before 28 October 2009), or industrial expansion projects that have already obtained an environmental licence from the state environment department (the SEMA). The main outcome of the ZAE has therefore been to only block brand new projects and expansion.

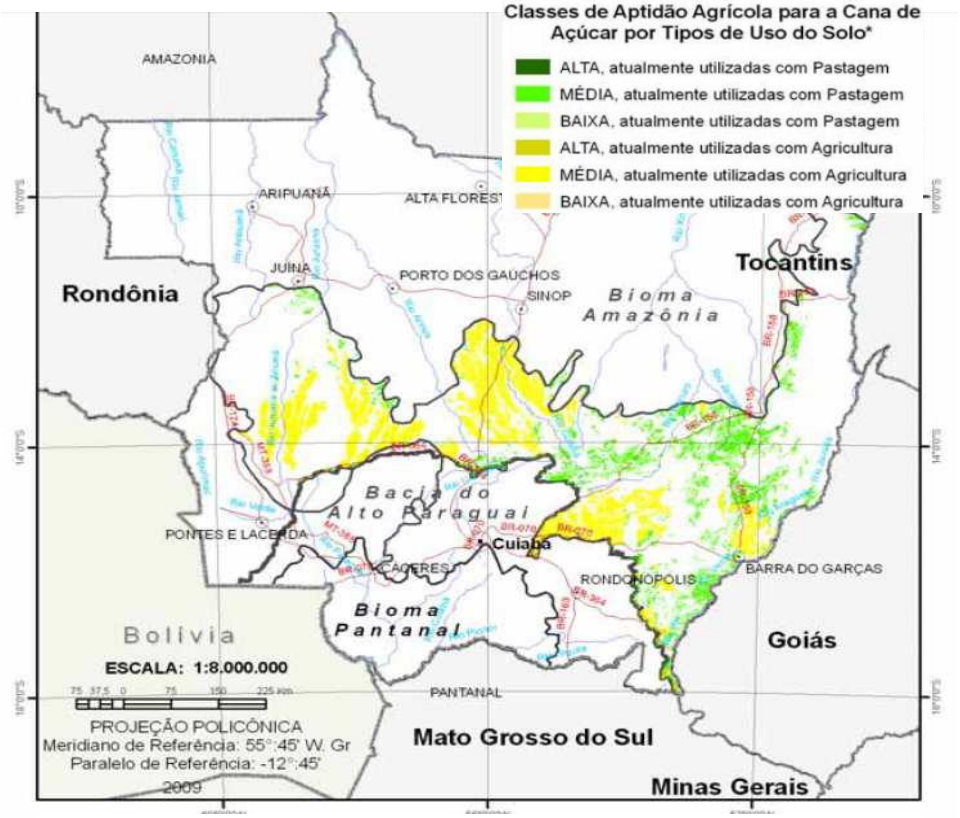
In fact, this provision seems to have restricted sugar cane expansion. Thus, for example, the Sincalcool representative (2012) acknowledged that the ZAE's prohibition of sugar cane expansion in the high Paraguay river basin, where Case Study 2 is located, had blocked the expansion of 1 to 1.4 million hectares in the region, with three projects in particular, in the municipalities of Tangará da Serra and Denise, being cancelled.

Agribusiness representatives nonetheless remain reluctant to accept the ZAE, arguing that planting should be allowed in the Amazon and Pantanal. As such, it was political calculations that triumphed here. For example, at a public hearing in the Agriculture Committee of the Lower House on 13th December, 2012, former Agriculture minister Reinhold Stephanes (Lula da Silva government) said that the ZAE was essentially 'symbolic', i.e. that Brazil wanted to show the world that it was committed to protecting the Amazon. He added that there was no technical reason for excluding the Amazon as a whole since new plantations occurred only in already cleared areas. Other protagonists also described the role of the ZAE as 'symbolic', stressing that it was drawn up in response to international pressure and used merely as a publicity 'stunt' at international conferences (CNA representative, 2012; MAPA official, 2012; Sedraf secretary, 2012; Sindalcool representative, 2012).

The upshot has been an apparent mismatch between sanctioned areas and where planters prefer to grow sugar cane. For instance, in Mato Grosso, 301,704 hectares of sugar cane were cultivated in 2013[194] even though the ZAE foresees a total of 6,812,854 hectares as suitable for sugar cane production there (on pastureland, cropland, with high, medium or low suitability for sugar cane, see Figure 6.2). It is therefore more a question of quality rather than quantity as, despite the great expansion potential, key-producing regions where expansion would be more suitable, are in the High Paraguay river basin.

[194] Source: Canasat, www.dsr.inpe.br/canasat/, accessed 8 May 2015.

Figure 6.2 The ZAE in the state of Mato Grosso. Exclusion of the Amazon and Pantanal biomes and of the High Paraguay River basin.



Source: Manzatto et al. (2009). The colour scale indicates the suitable areas for expansion: high, medium and low suitability pastureland on the top; and high, medium and low suitability cropland on the bottom.

This is why opposition to the ZAE has grown. State government officials and farmers in Mato Grosso considered the ZAE to be very negative for the state (Sedraf secretary, 2012; SEMA secretary, 2012; Famato representative, 2012). There was a shared sense of unfairness too among Mato Grosso state parliamentarians who depicted the ZAE as something done "inside an office without knowledge of the real world that ends up hampering the development of a region" (ALMT parliamentarian 1, 2012). Some contend that the ZAE is the result of the pressure of the powerful São Paulo distilleries and UNICA who do not want the sector to develop in Mato Grosso. A state parliamentarian was candid: "But what is that all about? It is the pressure of the *usineiros* [distillery owners] of São Paulo who do not want it to happen [the expansion of sugar cane in Mato Grosso]... it is the UNICA, they have created that lobby close to the Government" (ALMT parliamentarian 2, 2012).

The representative of the Sindalcool was equally outspoken. He recounted how approval was given to the ZAE in Brasília but that, curiously, "the silence of UNICA was 'deafening'". He then put his concerns directly to UNICA's President, Marcos Jank, but received an indifferent response, "that it

was a problem for Mato Grosso state to resolve". The Sindalcool representative said that he had responded angrily, saying that he could start talking and bashing sugar cane production in São Paulo over the Guarani aquifer: "if I have to, I can throw shit at the fan, with all due respect, I can also do that. Of course I do not have your [UNICA's national and international] projection, but after throwing mess at the fan, my son, everyone will be implied" (Sindalcool representative, 2012).

Blocking sugar cane expansion in the High Paraguay basin - Mato Grosso's most agriculturally suited area for that crop - has sparked local protest against the Federal ZAE. This also reveals unequal power relations in the ethanol sector in Brazil. Since the sugar-ethanol production of Mato Grosso is of residual importance in the national context, Sindalcool consequently finds itself in a less powerful position than UNICA, which is based in the great producer state of São Paulo. UNICA is therefore able to impose its own definition of sustainability, illustrating Lehtonen's (2011) centre-periphery analysis of the sugar-ethanol sector in Brazil.

However, UNICA was not the only culprit, according to the Sindalcool representative, bringing the Casa Civil and the international image of Brazil into the frame:

> We have been here for more than thirty years without any environmental problem, nothing... so what is the problem? You know where it [the ZAE] was decided? In the Casa Civil... the MAPA or the MMA have nothing to do with it!... so it was absolutely crazy... just because of that environmental summit in Copenhagen (Sindalcool representative, 2012).

The ZAE has also been contested in the Federal Congress. There, Mato Grosso parliamentarians have been engaging in moves aimed at changing its legal framework. Nilson Leitão (PSBD party), a federal parliamentarian in the Lower House from Mato Grosso, presided over the Subcana - a special sub-committee of the Agriculture, Livestock, Supply and Rural development committee (created in June 2012). The remit of the sub-committee is to propose changes to the legal provisions of the ZAE[195]. He was also the author of a legal bill[196] cancelling the above-mentioned CMN's resolution restricting the concession of rural credit to sugar cane producers to the zoned areas of the ZAE. Furthermore, in the Senate, law project No. 626/2011, by Flexa Ribeiro (PSDB, Pará), proposes the authorisation of "sustainable" sugar cane plantations in the Cerrado biome and "anthropic" areas of the Legal Amazon.

[195] As of April 2015, no final report with legislative recommendations had been adopted.
[196] PDC 476/2011, as of May 2015, still pending.

I succeeded in obtaining a brief interview with the MMA climate change secretary at the Rio+20 summit and asked about these moves by Mato Grosso politicians intended to ease the restrictions over the planting of sugar cane in that state. He answered that the MMA "does not cede to pressure" (MMA climate change secretary, 2012). It is uncertain therefore whether opposing the zoning Plan will ultimately achieve very much in Congress as it is a lengthy legislative process.

Notwithstanding the contestation surrounding the ZAE and the competing strategies and power structures behind it, in the meantime, the reputation of the ZAE is being consolidated on the international stage as a practical demonstration of Brazil's commitment to 'sustainable' ethanol production. However, the ZAE consists of a mere funding conditionality and does not affect already existing plantations (such as in Case Study 2, see Chapter 7), namely regarding their environmental legality (see Chapter 8). While there are indications that it has been effective in blocking new expansions of sugar cane in Mato Grosso - and its zoning allowing for a special protection of 'important' biomes and avoiding dLUC – the competition for suitable lands with soybean or cattle is an unsolved issue, underpinning issues of iLUC. These will be discussed in the next section.

6.3 Claims about biofuel land-use impacts

The preceding discussion highlighted the non-existence of environmental provisions deterring deforestation in the PNPB and the limited effects of the sugar cane ZAE in ethanol production. This raises issues about the land-use impacts of biofuels which are not properly tackled by those provisions. We examine next the biofuel land-use claims that are used to support such a *limited* inclusion of environmental conditionalities in biofuel policies, as part of the analysis related to RQ 2.

Biofuel land-use remains a field of competing claims more or less supported by science insofar as biofuel and knowledge politics are intimately intertwined (Borras et al., 2010)[197]. These claims are referenced by different actors either to explain and justify current land-use patterns or to rationalise future expansion needs. By dismissing the land-use impact of biofuels, it has become easier for different actors to sidestep environmental conditionalities in biofuel policies, as was explored in the previous section.

[197] Other negative externalities of biofuel development which are the focus of much academic research (see Borras et al., 2010), such as competition with food prices and social impacts (e.g. land access, labour, livelihood), are intertwined with land-use issues, as will become clear in the following sections/chapters.

As part of the discursive frames through which biofuels are promoted, these claims constitute a key factor in the politics of representation on which biofuel development depends. They also reflect this country's geopolitical representations of natural resources in general, and of land abundance in particular, intertwined as these are with visions of modernity – 'sustainable development' and 'ecological modernisation' or the win-win character of biofuel use – legitimising the country's chosen path for development and the image it wants to promote abroad. Here, and as Chapter 5 has shown, both biofuels and deforestation control are key, notwithstanding their contradictory interactions.

Through documentary analysis and interviews, I was able to discern five main discourses relating to the land-use impacts of biofuels. This section will explore those claims in more detail.

6.3.1 No direct link between biodiesel and deforestation

The first response from government officials and industry and agriculture representatives about the land-use impact of the biodiesel programme was that the PNPB could not be blamed for deforestation as it was not responsible for soybean expansion. According to them, even if such expansion gave rise to direct deforestation, biodiesel was a mere "sub-product" that was now being incorporated in a production chain that already existed and hence was regulated by soybean demand in the international market (MAPA official, 2012, MDA official, 2013; Ubrabio representative, 2012, CNA representative, 2012; SEMA secretary, 2012).

As Aracri (2011) notes, there is a growing demand for soy products both within Brazil (protein for feedstuff, oil for food or biodiesel production) and on the international market (protein or raw soybeans). The protein would be the 'noble' product, the basis of livestock nutrition in Brazil and elsewhere, while the advent of biodiesel production presented an opportunity for the already well-established agro-industrial companies (especially along the BR163 axis, where Case Study 1 is located, see Chapter 4) to benefit from the opening of a new market (biodiesel). They could hence sell their 'sub products', while reducing their production costs through their eligibility for the PNPB tax benefits scheme for industries with a social stamp (Embrapa Sinop official; Sindibio representative, 2012; Ubrabio representative, 2012; see also Aracri, 2011). The PNPB would hence be contributing to the 'verticalisation' process referred to in Chapter 5.

Not surprisingly, then, it is widely held that the PNPB has a negligible impact - with its mandatory blend targets, biodiesel auctions and benefits for farmers and industry with the social stamp - on land-

use choices, compared to the stronger 'forces' of the soybean international market. If there were deforestation, it would be driven by the consumption of protein in Europe and China, the Ubrabio representative (2012) told me, adding that "it is not the biodiesel programme that is going to make the farmer plant soybeans, he is going to plant either way, as he already planted before the biodiesel programme".

Given the multi-purpose nature of soybean production – i.e. it is possible simultaneously to supply the food and biofuel chains - it is difficult to gain a clear indication of the impact the PNPB has on deforestation (see too Gao et al., 2011)[198]. In fact, there is no spatial 'dedication' allowing the separation of food from fuel feedstock land-use, beyond the inherent overall complexity of tracking soybeans in a very fragmented and complex industry-supplier structure.

Indeed, few scientific studies have tried to grasp this complex interaction. Lima et al. (2011), for instance, suggested an approximate 0.8% to 5.9% of the total deforestation in Mato Grosso was caused by the PNPB, but these figures were obtained by merely multiplying the part of the forest loss due to soy expansion (13.4% to 16.8%)[199] by the fraction of oil in a soybean (18%) and then by the percentage of soybean oil needed to achieve Brazil's biodiesel blending target (estimated at 35%)[200]. But this simple calculation does not consider iLUC (see below), does little to understand the causal effect of the PNPB on deforestation and fails to cast light on the dynamic effect of the PNBP in driving deforestation. As farmers continue to plant soybeans, it is only by asking local farmers can we discover how decisions are made and determine whether or not the PNPB is bringing new, additional, pressure to bear in terms of deforestation (see the local biofuel land-use dynamics analysis in Chapter 7).

6.3.2 No direct deforestation and the timber-cattle-soybean/sugar cane progression

When considering the GHG emission life cycle of biofuels, it also needs to be remembered that alternative vegetation cover in a given area would also sequester carbon. Direct conversion of one land-use to bioenergy feedstock production, or dLUC, can result in a change in above- and below-

[198] Sugar cane could also be considered multipurpose, but to a lesser extent as there must be a choice, influenced by international sugar prices and national stimuli for ethanol production, of either producing sugar or ethanol. Furthermore, industry implantation is spatially specific, so it is easier to track production and farmers' holdings.
[199] Referencing Morton et al. (2006) and Nepstad et al. (2009) on forest clearance attributable to cropland; and Wright (2009) for soy as percentage of cropland area.
[200] The outcomes would vary, depending on basing the calculations on soybean weight or on values of soybean; or if the economic inseparability of oil and soy meal would be considered. Plus, soybeans do not supply 100% of the biodiesel produced in Brazil, so the calculation would be overestimated.

ground carbon stocks, the outcome depending on the specific context of the site: prior land-use (rainforest, savannah, cropland), type of soil, climate, crop practices and the kind of crop to be grown (e.g. sugar cane, soybean or oil palm) (IPCC, 2012).

Land-use conversion "leading to a loss of carbon stocks can thus lessen, and in some cases more than neutralise, the net positive GHG mitigation effects of biofuels" (IPCC 2012: 214). The issue has been a politically contentious one and the focus of different scientific approaches. Fargione et al. (2008) for instance, stated that biofuels caused more emissions than conventional fuels if the totality of the emissions was considered, from deforestation and land-use to consumption. These authors have calculated the number of years of biofuel production necessary to compensate the GHG emissions if the land used for production was deforested, with the worst value of 420 years in the case of palm oil in tropical forest, while soybean in the Amazon for biodiesel would be 320 years; the shortest period would be sugar cane planted in Cerrado at 17 years. Righelato and Spracklen (2007), in turn, suggested the protection of non-cultivated areas such as forests or savannahs for thirty years would avoid between two and nine times the emissions of GHGs than the use of biofuels produced in those same areas during the same period.

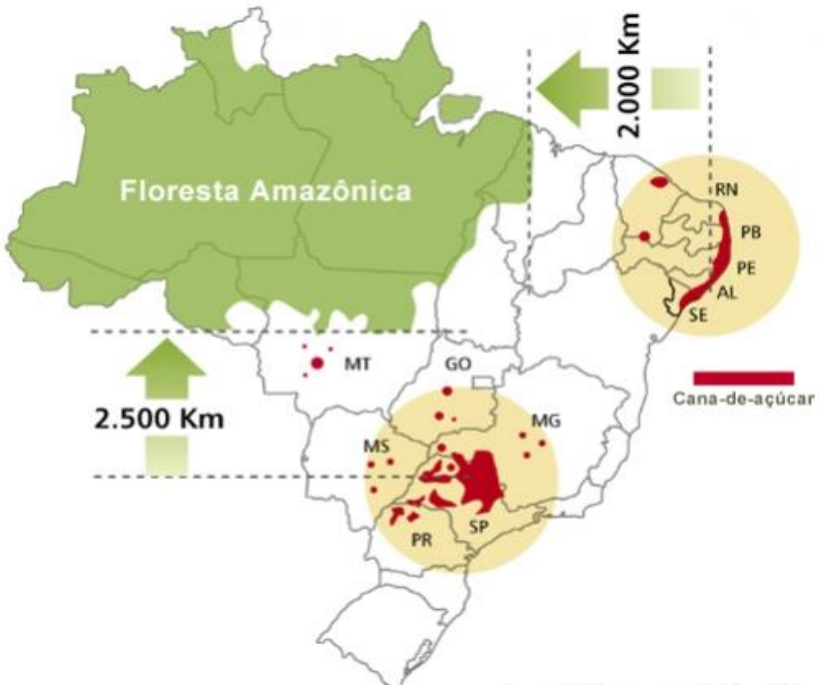
True, there is a wide range of dLUC estimates reflecting the uncertainty and variability in the estimated GHG emissions from bio-energy systems. However, scientific evidence points to a potentially significant impact of dLUC. Given the relevant evidence by the international scientific community, Brazilian officials and industry and agriculture representatives have adopted the great narrative that both soybean and sugar cane expansion was occurring in previously deforested areas such as pastureland or other croplands, and not at the expense of natural vegetation, especially in the Amazon (MAPA official, 2012; Embrapa Agro-Energy official, 2012; Abiove representative, 2012; Ubrabio representative, 2012; CNA representative, 2012; Famato representative, 2012).

As such, most of these representatives I interviewed were outraged at the accusation that biofuels were developed at the expense of 'forests' (the Amazon): "it is fundamental that we break that myth that biodiesel is produced in the Amazon… that does not happen, it is a myth. It is lack of knowledge, ignorance, by the EU" (Ubrabio representative, 2012). Most sugar cane expansion (i.e. for ethanol) has taken place at the expense of the Cerrado biome (which is itself composed of 'forests' and other vegetation types) and in already deforested areas (Sindalcool representative, 2012).

The map by UNICA (Figure 6.3) showing sugar cane plantations at some distance from the Amazon is perhaps the best illustration of this view. A CNA representative, for instance, justified their position on the basis of the long distance between biofuel crops and the “opening areas” [frontier] (CNA representative, 2012), which finds parallel in some parts of academia (e.g. Goldemberg and Guardabassi, 2009; La Rovere et al., 2011).

As for soybean expansion, it has certainly contributed to dLUC in Mato Grosso. From the early 2000s it emerged as a key driver of deforestation in the Amazon, directly causing 17% of Mato Grosso’s forest clearing (Brando et al., 2013). Morton et al. (2006) similarly conclude that about 16% of forest clearing between 2001 and 2004 in the southern Brazilian Amazon (of which Mato Grosso is a notable part) was due to cropping, and of this, 84% was for soybean expansion (Wright 2009), with the rest due to cattle ranching (Morton et al., 2006).

Figure 6.3 UNICA’s map highlighting the distance of major sugar cane producing regions to the Amazon forest.



Source: UNICA’s website, http://www.unica.com.br/, accessed 12 May 2013.

Yet this story shifted following the Soy Moratorium[201]. Abiove's monitoring shows that only 0.41% of deforestation from 2006 to 2011 in the Amazon biome was due to soybean expansion (Abiove et al., 2012)[202]. The Sedraf secretary (2012) concurred, arguing that direct deforestation by soybean expansion had stopped, as it was now expanding into degraded pastureland.

So who can be blamed for the continuing high rate of deforestation in Brazil? According to my interviewees in the sector, the great deforestation vector would be 'predatory', extensive cattle ranching in the 'frontier' regions. Starting with logging, these areas would then be used for cattle ranching and only later for soybean or sugar cane (SEMA official 1, 2012; Embrapa Agro-Energy official, 2012; Embrapa Sinop official, 2012; Sedraf secretary, 2012; CNA representative, 2012). This view fits in with the 'typical' timber-cattle-soybean/sugar cane progression pushing agricultural expansion into the Amazon (Bernardes, 2007; Zamparoni, 2007). The various stages of progression are used in a blame game in which cattle ranching is accused of being primarily responsible for deforesting (and here the key role of clearing the land to guarantee ownership and speculate, see Hecht, 1989; 2011), compared to the 'efficient' and highly profitable soybean and sugar cane sectors that only appear after such ranching has already despoiled the land. Yet as an environmental NGO representative said: "generally there is no such separation, those who have cattle also have crops, they are together, they are the same class, the same category" (Formad member 2, 2012).

While this widely accepted model is nonetheless still used to describe Brazilian Amazon deforestation in general, it should not be taken as a rule. In fact, "land-use change is not a linear progression through a predictable sequence of stages" (Browder et al., 2004: 221).

Land-use change resulting from the arrival of settlers and expansion of economic activities into relatively 'virgin' areas in the Amazon has been the focus of a range of models and explanations about the 'frontier'. The issue of the 'frontier' has been grasped by 'classical' approaches including

[201] The Soy Moratorium is a voluntary agreement by different companies of the sector aimed at ensuring in the international market that there is no soybean expansion at the expanse of the Amazon. As an answer from the sector to international criticism, especially from environmental NGOs such as Greenpeace, it encompasses the main companies involved in soy production in Mato Grosso (e.g. ADM, Bunge, Cargill, Amaggi, Fiagril) and the Abiove (Brazilian Association of the Industry of Vegetable Oils). It is also supported by different NGOs such as Greenpeace, the NC, and WWF Brazil. The companies do not accept soybean from lands deforested after July 2006, so soybean expansion can only occur in already deforested lands. Theoretically, no soybean has been planted at the expense of forest in Mato Grosso since that year. The issue of indirect deforestation, however, remains untackled (Arima et al., 2011; see next section).

[202] In the three monitored states (Mato Grosso, Pará and Rondônia) 3.47million ha were deforested (from a total of 4.51million ha in the whole Amazon biome) from the beginning of the Soy Moratorium in 2006 until 2011. Approximately 0.53% of the deforested areas in those states were planted with soybeans. The monitoring system selected 58 municipalities in those three states corresponding to 98% of soybean planted areas in the Amazon biome and in those municipalities only 3.04% of deforestation was due to soybean plantations (Abiove et al., 2012).

Turner's and Holanda's for the US and Brazil, respectively – whereby narratives of nation building integrate the 'physical dimension' to explain the character-shaping of population (see Chapter 2). More current debates include Velho (1979); Becker (1988); Schmink and Wood (1992); Cleary (1993); Bernardes (2007); Browder et al. (2008); or Martins (2009).

As seen in Chapter 2, debate here has been shaped by approaches ranging from Neo-Marxist perspectives on the expansion of capitalism into pre-capitalist societies to more anthropological stances about the clash of different civilisations – a discussion that goes well beyond the aims of this thesis. Very briefly, though, the 'frontier' should be grasped in a non-essentialist way and not as an ontologically given entity, but as a context-specific *process* ("frontier is movement and mobility", Castro, 2005: 11) where time and space are key variables.

The kinds of actors and their spatial trajectories (the 'who' in the equation) is crucial for an understanding of the evolving 'frontier' (Castro, 2005; Pacheco, 2012). As Pacheco (2012: 864) has argued, Amazon frontier expansion would be a "process that depends on multiple exogenous and endogenous factors operating at diverse scales, but whose trajectory depends on the dominant actor type occupying the frontier landscape". However, when analysing deforestation patterns in the Amazon, more than drawing on essentialist categories of actors (e.g. 'landless migrants', 'small farmers', 'ranchers', 'capitalised farmers', 'land grabbers', and others) it is perhaps more insightful to acknowledge transformations of both actors and land tenure with time (Fearnside, 2008). The relations between actors (e.g. between small landholders and large, well-capitalised farmers, see Aldrich et al., 2006), including the importance of local property rights (see too Aldrich et al., 2006) are also key to understanding local dLUC. Finally, the overall role of agency (Browder et al., 2008) in mediating the driving forces of economic expansion (such as national policies and changing economic stimuli), including aspects of motivation, identity and conflicting representations of land should be taken into consideration (see Chapter 8).

Fixed and simplistic models thus fail to provide a comprehensive account of the shape and driving forces of biofuel feedstock dLUC, being necessarily a context-specific approach. The task is daunting; no single academic study has grasped all the above-mentioned aspects and there is no single or unified theory of frontier expansion (Walker, 2004; Browder et al., 2008). Case study approaches

could be insightful here and complement the more common approaches of generalisation or macro-modelling (invariably privileging quantitative and GIS modelling).

This does not mean that the 'typical' logging-ranching-soybean/sugar cane progression should be dismissed or considered to have no informative value in the analysis of biofuel feedstock dLUC. In fact, there are reasons to believe that dLUC does happen in exactly this way in many instances. The Ibama official in Sinop, in charge of the monitoring and control of deforestation in the northern region of the state, surrounding the BR163 road, corroborated the progression narrative with his experience from the field, showing me how the frontier had expanded northwards on a map of the state, from the Cerrado, then transition areas, all the way to the 'deep' Amazon. He stated that predatory, extensive cattle ranching was now in the extreme north and that many cattle areas in Mato Grosso were being transformed into cropland, especially for soybeans and hence were becoming a "consolidated" area: "In Monte Verde, Alta Floresta, before you wouldn't see crops, today when you go there you only see soybeans. Kilometres and kilometres, if you take a car, you will only see soybeans" (Ibama Sinop official, 2012).

The fact that most dLUC does not happen solely on account of soybean expansion does not imply there is no intention of cultivating soybeans in the longer term (Lima et al., 2011). Soybean production, given the very lucrative international price (see Chapter 7), can be the main objective, even if the land was initially 'prepared' with rice, and/or underwent a phase of cattle ranching. These land-uses constitute an initial phase to 'tame the land' (Sauer and Leite, 2012). Moreover, soybean cultivation immediately after clearance is difficult and expensive (Embrapa Sinop official, 2012) because debris from clearing hinders soybean growth and yield and investment must be put into lime in order to correct the soil's acidity (Jepson et al., 2010). Sugar cane too would involve a transition - from pasture to annual crops and then finally on to sugar cane, a common management practice to improve physical and chemical soil characteristics of degraded pastureland (Nassar and Moreira, 2013).

In some cases, there is dLUC from soybean expansion owing to the high prices this commodity can fetch on the international market. As the Ibama official in Sinop acknowledged, direct deforestation by soybean expansion was occurring there, especially in the municipalities in the north of Mato Grosso where Case Study 1 is located. In this region, the vegetation would not be too dense, the terrain is a

plain, so it would be possible to easily clear the forest and start planting rice, then soybeans. He also stated that in this region there has only been modest cattle ranching owing to the highly profitable soybean prices, thus counter-posing the progression narrative.

The official briefly described how deforestation occurred:

> The first stage is removing the valuable wood for the timber industry; the forest then remains with a lot of branches and broken vegetation, so much more vulnerable to fire, so then someone sparks a fire. Then it is almost practically 'dismantled'. It may even regenerate but most of the trees end up dying, that is the first stage. Then, in the next year, the 'individual' uses the '*correntão*' [a big chain, see Figure 8.2] and the 'bulldozer', to remove what was left - the forest remains are very fragile… then they plant rice in the first year and from then on soybeans (Ibama Sinop official, 2012).

Soybean and sugar cane is therefore expanding mostly on land that has already been cleared. In some cases dLUC is taking place, while in others some farmers have been discouraged from clearing forests, in view of the current environmental restrictions (Embrapa Sinop official, 2012; plus see Chapter 8). However, even if dLUC was not happening, there are further questions that need to be addressed regarding the displacement of other crops and cattle ranching, due to the occupation of lands by biofuel feedstock.

6.3.3 Dismissing or ignoring indirect deforestation

In fact, as Sauer and Leite (2012) have highlighted, the expansion of soybean and sugar cane in Brazil did not happen in isolation from other production systems, including cattle ranching. Since land is not an infinite resource, there cannot be an increase of energy crop surface without it affecting or competing with food crops and natural ecosystems. Even for countries rich in 'available' land, such as Brazil, in the medium and long term there would inevitably be land-use conflicts.

Indirect LUC (iLUC) occurs when a change in a certain agricultural production leads to a market-mediated shift in land-use activities in another area, distant to the primary driver (IPCC, 2012). Given the 'tendency' of timber-cattle-soybean/sugar cane progression described in the previous section, it becomes evident that as soybean and sugar cane gradually expand over pastureland, something must happen to cattle ranching, and the obvious answer is that it is being displaced towards the Amazon, so pushing forward the 'frontier'. However, as previously highlighted, both the sugar cane

zoning and the soy moratorium are only designed to address direct deforestation in the Amazon (while the Cerrado is absent from the 'concerns').

iLUC remains largely ignored by the State and is dismissed by agribusiness. Some interviewees acknowledged iLUC was happening, such as Mato Grosso's State Environment Secretary (2012) who said candidly: "it is a reality. Displace or replace pastureland for crop production. Impossible to define. Let the scientists solve that!" The MMA official recognised that sugar cane expansion in the state of São Paulo since 2002 had pushed some crops to other regions (MMA official 2, 2013). However, in general, iLUC was poorly acknowledged by Federal and state officials and agriculture representatives whom I interviewed as it was deemed impossible by them to prove or to measure. Scientific uncertainty has therefore been used as an excuse for inaction nationally and as the basis for Brazilian criticism of EU plans to include iLUC in its legal framework (see Chapter 5; see too Bailis and Baka, 2011).

NGOs and scholars too were sceptical about the possibility of clearly defining the issue, with an ISA member saying: "How to measure the spilling effect, where is all that cattle going? There is no qualified study about that" (ISA member, 2013); while an FGV scholar stated, "measuring it to the point that you can certify a particular quantity of deforestation, it is impossible, still I think the Brazilian government is not looking with attention to this issue" (FGV scholar, 2012).

In fact, iLUC is not observable, and is difficult to model and to ascribe to a single cause (Gawel and Ludwig, 2011; IPCC, 2012). As seen above, deforestation in the 'frontier' is a complex phenomenon shaped by the interaction between different ecologic, economic and demographic processes within a specific time and space context, rather than the outcome of a single crop market. There is therefore a 'causality problem', i.e., how to establish causality if bioenergy is not the only driver of LUC, but is part of a multiplex economic system incorporating food production, logging and other activities (Gawel and Ludwig 2011). The task of trying to explain and measure biofuel iLUC in the Amazon will always be bedevilled by the complexity of this economic system (Bailis and Baka, 2011).

Scientific discussion on the modelling of such a complex process is beyond the scope of this thesis (for more on this, see Plevin et al., 2010; Prins et al., 2010; Nassar et al., 2011 and Humalisto and Joronen, 2013). The reliance on quantitative, macro modelling, however, could be seen as an over-simplification of reality with assumptions that hardly approximate to such a complex and contextual

process (as Humalisto and Joronen, 2013: 182 stress, the calculations are unable to grasp “the heterogeneous topologies of actual biofuel production”). iLUC is certainly difficult to deny, but the quantification imperative to inform policy-making remains a much praised yet contentious objective (Gawel and Ludwig, 2011).

Different scientific studies have nonetheless suggested that biofuel expansion has a iLUC effect. Fargione et al. (2008) and Searchinger et al. (2008) conducted some of the first studies encompassing the biofuel collateral effects of iLUC, provoking a debate that is still ongoing. More recently, Arima et al. (2011) demonstrated that iLUC was significant and of considerable magnitude during 2003-2008, while Lapola et al. (2010) have shown that the expansion of biofuel crops (soybean and sugar cane) in Brazil would provoke iLUC, especially pushing the pastureland frontier into the Amazon. The displacement of pastureland due to soybean expansion, northwards towards the Amazon, between 2000 and 2006, was also suggested by Barona et al. (2010). The increase of the Amazon cattle herd between 1990 and 2006 would have in turn been responsible for 80% of the total increase in Brazil (Barreto et al., 2008).

Regarding sugar cane expansion, Rafael Feltran-Barbieri (2012) focused on the state of Goiás and detected that cattle ranchers migrated to municipalities in the Amazon and Pantanal, while displaced soy producers were expanding their activities to the municipalities of Cerrado in the Legal Amazon, especially in the region between the rivers Xingu and Tocantins (Feltran-Barbieri, 2012). There would be regional competition between agro-energy and food production, with a consequent deepening of encroachment of ecosystems (Feltran-Barbieri, 2012). Novo et al. (2010) and Sá et al. (2013) have also cast light on the indirect effects of sugar cane expansion in São Paulo.

According to the Ibama official in Sinop, from experience of what was happening in the field, soybean cultivation was extending its reach into areas previously occupied by cattle and that land speculation resulting from soybean prices would likely displace cattle ranching to other regions (Ibama Sinop official, 2012). Speaking of a case he knew from the municipality of Canarana in the Xingu region where there has been strong soybean expansion, the ICV member (2012) said cattle ranchers were renting out their pastureland to soybean producers. But for him it was not possible to categorically say this would result in the expansion of cattle into forested areas, as many ranchers were selling their

cattle, while others were keeping part of their cattle and investing in more “technological” production methods.

This unclear situation may change as the INPE’s TerraClass satellite-based project sheds more light on land-use substitution. The MMA official 2 (2013) placed much hope in this system for generating a better understanding of land-use substitution. With land-use data from 2008, he showed how 60% of the deforested area in the Amazon was occupied with pastureland while soybeans only occupied 4.9%, and hoped he would be able to determine what the situation was in 2010 (report still unavailable when I conducted the interview), so that “we can do a transition matrix, to see what was pastureland, what remained as pastureland, if secondary vegetation increased or diminished, and you start to better understand the land-use dynamics” (MMA official 2, 2012).

Despite closer attention being given to the issue of iLUC in the Ministry of the Environment, the Brazilian government nurtures the illusion that food production and biofuels can co-exist without problems of competition for land, water or investment and without amplifying deforestation in the Amazon and Cerrado. The overall narrative is that, there is plenty of land to expand on, while no discussion is held on the actual need for expansion nor the effects of the expansion of sugar cane and soybean on land prices and concentration.

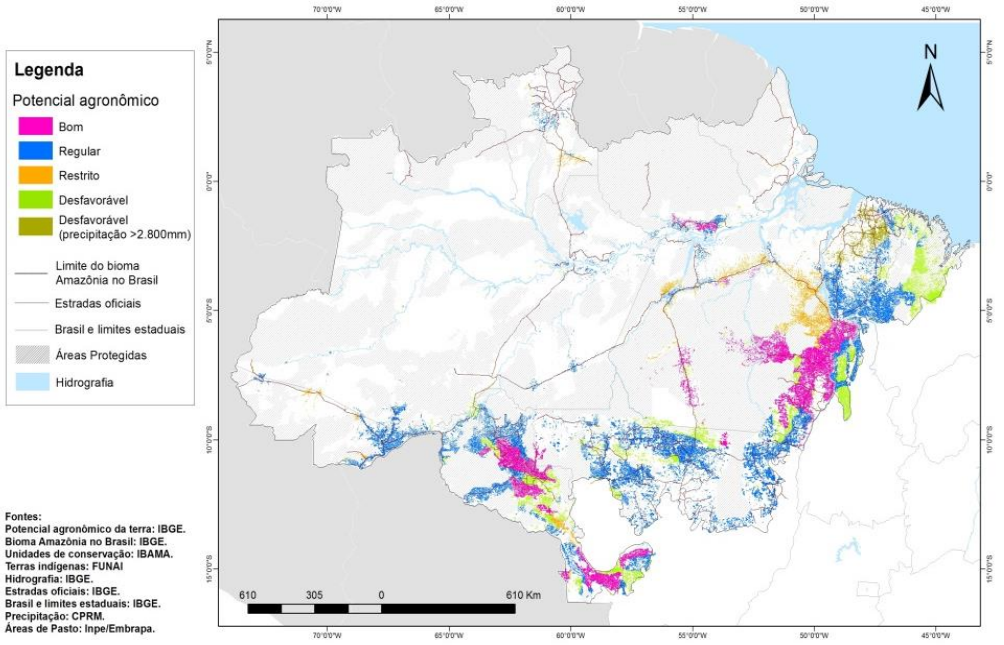
6.3.4 An abundance of land and the degraded pastureland promise

The Brazilian government and biofuel lobby argue that Brazil, unlike the USA and the EU, has a large amount of land which could be cultivated for the simultaneous expansion of biofuels and food, without the need to deforest. This resonates with the representation in geopolitical practices and the Brazilian inexhaustible resources narrative justifying a permanently moving ‘frontier’ (see Chapter 5). The rhetoric reflects not only the current land-use dynamics associated with biofuel feedstock expansion but it also reveals some ‘wishful thinking’ about future expansion occurring exclusively on degraded pastureland:

> Unfortunately the image that remains is the one from the past, but Brazil in terms of exploitation of forests has changed a lot. And we can never find that deforestation is occurring in Brazil to plant soybeans, that is not true. There is a great area available to expand production before needing to go into the forest (Embrapa Agro-Energy official, 2012).

There is in fact much degraded land, especially low-productivity pastureland that could present an opportunity for improving efficiency (Macedo et al., 2012; Barreto and Silva, 2013). Much of this has been deforested to guarantee private ownership of public land for speculation, leading to a huge stock of land 'improperly' used (see Figure 6.4).

Figure 6.4 Agronomic potential of degraded pastureland in the Amazon biome.



Source: Barreto and Silva (2013). Agronomic potential scale: pink – good; blue – regular; orange – limited; green – not suitable; dark green – not suitable due to high rainfall.

The expansion of sugar cane, for instance, could be accomplished on degraded pastureland, according to the Brazilian government and biofuel industry (Embrapa Agroenergia leaflet, 2011; MAPA official, 2012; CNA representative, 2012; see too ICONE's stance in Nassar and Moreira, 2013). Cattle ranching displaced by biofuel feedstock would not give rise to deforestation elsewhere because of greater intensification within the cattle ranching systems, as the number of heads per hectare would increase (more on the modernisation of agriculture in the next section).

Referring to the official prediction that sugar cane zoning will give rise to an anticipated doubling of production, with all the expansion taking place in previously deforested areas, the Itamaraty official argued that "biofuels only occupy roughly 1% of Brazil's agricultural surface, so there is a great

availability of land for them to expand, without any kind of deleterious effect on the production of food" (Itamaraty official, 2012)[203].

The Embrapa Agro-Energy official (2012) also drew attention to the abundant supply of land: "Still, we have Cerrado, deforested areas… more than 90 million hectares that can be incorporated in agricultural production, without touching the Amazon." Here again deforestation of the Cerrado is seen as socially accepted[204].

As for Mato Grosso, production is expected to increase in areas that have already been opened up (Sedraf secretary, 2012) and hence there would be no need to "open" new areas (ALMT parliamentarian 3, 2012). This view was repeated by other state parliamentarians: the availability of degraded pastureland for the expansion of biofuel feedstock and the need for resources to make it more attractive for farmers to recover already used lands instead of expanding into new areas (ALMT parliamentarians 2 and 4, 2012); another Mato Grosso state parliamentarian noted that:

> We have, only in Mato Grosso, more than seven million hectares of totally unproductive areas that were cleared in the past … these may be inserted in the productive process without the need to cut one single tree… So I think it is equivocal, we practically deforest very little compared to what we could deforest… and without causing any problem to our ecosystem (ALMT parliamentarian 1 2012).

Expanding into areas of native vegetation however is an option that is open to farmers since, under the Forest Code, they are entitled to deforest part of their holding, as highlighted by the agribusiness lobby (CNA representative, 2012). ICONE (Nassar and Moreira, 2013) too estimated that from the 554 million hectares of native vegetation in Brazil, 344 million hectares would be located in private properties, where owners have the right to deforest. So apart from the mandatory exclusion provided by the Forest Code, there would be 72 million hectares of native vegetation in private areas that could be legally deforested for energy crops or other products. The authors, on behalf of ICONE (2013) have compiled this analysis in order to neutralise EU fears of iLUC in Brazil that would result from biofuel expansion but, ironically, the Institute ends up acknowledging that the reduction of the iLUC would be carried out at the expense of clearing native vegetation (dLUC). Mato Grosso's Sedraf

[203] Sugar cane occupies 'only' 1% of the territory but, together with other energy crops such as soybean (2.7%), corn (1.8%) and cotton (0.3%), they represent ¾ of the whole Brazilian agriculture crop area (Feltran-Barbieri, 2009).
[204] An Embrapa Agroenergia leaflet (2011: 3) on "Brazilian Agriculture: Food and energy for a sustainable world" refers the availability of 90 million hectares of "available and virgin areas of the agriculture frontier"; and 210 million hectares of pasture "in some stage of degradation, which can be recovered and become productive by the application of technology"; where expansion of sugar cane and oil bearing crops can take place without infringing on the Amazon (implicitly the Cerrado is appropriate for expansion).

secretary (2012) agreed that only 30% of what was legally possible to clear had been cleared in the state, thus there still was an opportunity for expansion.

The right to clear in private areas seems a strongly held principle for local actors in Case Study 1 (see Chapter 7) but the overall question is how and why so many areas in Mato Grosso have been privatised and so few protected areas have been designated (see Chapter 4). This is relevant because the promise of degraded land does not happen 'by decree', rather it is a private decision, with farmers making their own decisions as to how to use the land, guided by pointers from both the market and government.

By remaining purely abstract, the 'degraded land' narrative ignores the context-specific dynamics (including market prices, policies and institutions such as land ownership) shaping owners/users' behaviours, as well as its relations with other activities in the land-use dynamics of the 'frontier' (Feltran-Barbieri, 2012). The costs involved of using degraded lands is a critical factor, as frequently it is cheaper to open up new areas than recover an already used one (Greenpeace member, 2013). The degraded land promise thus remains an abstract one, perhaps calling for more effective land planning which currently does not happen in Mato Grosso, where a State Zoning Plan has still not been implemented (see Chapter 8).

In fact, in the 'real Brazil', the offer of such abundant degraded pastureland would still not be enough to create proportionally-adjusted demand. By contrast, biofuel crops would likely expand according to economic and agronomic adequacy criteria: favourable topography for mechanisation; soil fertility; liquid revenue from investments; opportunity costs of degraded pastureland; operational costs of transport, etc. In these circumstances, agricultural land already used for food crops or with vegetation would be, at least, as attractive as pastureland (Feltran-Barbieri, 2012)[205]. The 'extraordinary' availability of 'degraded land' as a justification for biofuel feedstock expansion that does not compete with other land-uses would therefore be misleading, and only serves as mere scale abstraction (Feltran-Barbieri, 2012).

Environmental NGOs too seemed sceptical about the available land promise (Formad member 1, 2012; ISA member, 2013; Greenpeace member, 2013). The ISA member, for instance, acknowledged

[205] Feltran-Barbieri (2012) found that sugar cane expansion occurred only in small quantities on degraded pastureland, in the state of Goiás leading to regional competition between agro-energy and food production while simultaneously creating pressure on the ecosystems.

that there had been some conversion of degraded pastureland to crops but that it was not infinite and did not happen by itself. Major constraints were the price of commodities, the limit of the pastureland capacity and agrarian suitability (ISA member, 2013).

According to the Greenpeace member the expansion into degraded lands still wasn't happening as government officials, parliamentarians and agriculture representatives had claimed, being merely empty rhetoric. Questions regarding the agriculture sector's real need for expansion would therefore arise:

> So what is the real expansion they will need in the coming years?… Our discourse is that you need zero deforestation in the Amazon… because you already have plenty of areas that have been cleared…. What is the real volume of abandoned or degraded lands? Those numbers vary a lot!… what is the real expansion need of the agribusiness sector? What are the growth rates that this sector wants to have in the coming years? How many degraded lands can be recovered and used in that expansion? What is the cost of using those areas? (Greenpeace member, 2013).

Furthermore, using 'degraded land' in a depoliticised and uniform way can obscure the wide range of land types, tenure relations, local perceptions and social-ecological interactions (Bailis and Baka, 2011). Still, 'marginal', 'idle', 'degraded', 'under-utilised', 'sleeping', 'wastelands' and 'abandoned croplands', all are variations of what is promoted as the 'solution' for the food-versus-fuel question and ecological impacts of growing crops for biofuels in the world.

This is particularly relevant for Brazil where not only is there a commonly held belief in the abundance of land, but also classifications such as 'degraded' or 'abandoned' can have strong political repercussions. In fact, this is relevant in terms of agrarian reform strategies[206]; and also relates to the *uti possidetis* principle, whereby land must be cleared to prove ownership, a principle that has in both colonial and postcolonial times guided occupation and privatisation of lands in Brazil (see Chapter 4).

6.3.5 Ecological modernisation in agriculture

One important innovation reflecting the general confidence in re-using land as a 'sustainable' way forward was the creation of an Embrapa R&D centre in Mato Grosso, called *Embrapa Agro-silvo-pastoril* (crop-livestock-forestry). I attended its official opening on 6 July 2012, when national and state

[206] According to the Brazilian Constitution, 'abandoned' land can be claimed for agrarian reform objectives (see too Wolford, 2010).

politicians as well as agriculture representatives gathered to praise the ecological modernisation prospects of agriculture in Mato Grosso (see Figure 6.5 and Figure 6.6).

It was significant that a decision was taken to locate this Embrapa unit in Mato Grosso, as the state is known for high rates of deforestation and to place it precisely on the BR163, the major centre of soybean production in that state. The Unit's activities are centred on integrated systems of production known as “integrated crop-livestock-forestry systems”, aligned with the national climate change policy and its ABC programme (low carbon agriculture programme, see Chapter 5). The theory was that by integrating these activities and making them more efficient there would be less need to expand into agricultural areas, thus reducing direct and indirect deforestation.

The Embrapa Sinop official I interviewed explained that there would be mixed agriculture (e.g. soybean), cattle and forestry (e.g. *Eucalyptus*, teak) in the same area. Wood could have commercial value but would also provide thermal comfort for cattle and contribute to nutrient recycling. It was envisaged that this system would help promote greater economic stability for farmers as they would not be solely dependent on one activity, thereby insulating them against international fluctuations in commodity prices.

Figure 6.5 The opening ceremony of Embrapa Sinop: the Minister of Agriculture addressing the meeting.

Source: the author (July, 2012).

So it would be “a system that I think will be a second green revolution… environmentally and socially more interesting than the first green revolution” (Embrapa Sinop official, 2012). The Cerrado-Amazon transition region would in turn achieve higher productive stability, to which end the Embrapa unit in Sinop would be involved through R&D, instigating a series of pilot studies in that region around the BR163.

Figure 6.6 The brand new Embrapa Sinop building on the opening day.

Source: the author (July, 2012).

It was expected that by increasing cattle ranching intensity and soybean yields through crop rotation, less acreage would be needed for crop expansion (Embrapa Sinop official, 2012). There would be potential also for sugar cane production, as ICONE (Nassar and Moreira, 2013) foresaw the development of sugar cane-cattle integration systems that would reduce the iLUC risk of ethanol yet still allow room for soybean and corn production in the areas under renovation. While (consecutive) double-cropping was already common in soybean cultivation, the potential for sugar cane was less evident. But sugar cane ratoon needs to be renovated after 5 or 6 years of harvesting in order to recover yields, and this can be done by rotating the crop with soybean, thus diminishing iLUC and food-versus fuel fears (Nassar and Moreira, 2013).

Legislators in Mato Grosso were enthusiastic about the prospect of achieving agricultural expansion without deforestation, aided by the use of technology (ALMT parliamentarians 2, 3 and 4, 2012). Plans to intensify cattle ranching by confinement and semi-confinement would reduce pressure on the

Amazon ‘frontier' and in the process render deforestation less economically viable, also sorting out one of the region’s long standing political and international headaches.

Intensive cattle farming provides a good example of how the desired ‘verticalisation’ in industry could be realised. Since intensive cattle farming requires more feed, this in turn provides an incentive for soybean pressing to be carried out locally, removing the need to export while simultaneously giving a boost to home biodiesel production (Sedraf secretary, 2012), a prospect that would however depend on the relative prices of soybean in the international market. For the Sedraf secretary (2012):

> Cattle areas in the coming years, with the increasing value of lands, will not be able to support a low density of animals per hectare, so production will be more concentrated. Instead of reducing the cattle herd, we are going to increase it… we will be producing more in a lesser area, thus avoiding deforestation.

The future would therefore be bright for agriculture-centred Mato Grosso. The Secretary contended that Mato Grosso was capable of “feeding the world” in a sustainable way and indicated that the agribusiness sector and the MAPA were aligned in that discourse:

> We do not simply want to be the biggest producer [of grains in Brazil], we want to be the most efficient one and produce in a sustainable way. That is the quest of the state government together with the federal government and the farmers. If you talk to someone in the MAPA about that, they are going to tell you that, federal law-maker Homero Pereira too, the Famato will also tell you that (Sedraf secretary, 2012).

The professionalisation and increased mechanisation of agriculture in Brazil, it is claimed, has already led to a “highly technical, efficient agricultural production, making the most of natural resources” (Embrapa Agro-Energy official, 2012), with Brazil being “one of the most efficient agricultural producers in the world” (Nassar and Moreira, 2013: 6). Increased sugar cane and ethanol yields, double-cropping (with its *safrinha* or second harvest, an example of agriculture intensification according to VanWey et al., 2013) and productivity gains in grass-fed livestock would amply demonstrate the success of the land intensification process in Brazil (Nassar and Moreira, 2013).

Indeed grain production has become one of the main vectors of the expansion of Brazilian agriculture in recent years as a result of improved seeds, the heavy use of chemicals and greater mechanisation all contributing to huge productivity gains (Egler, 2007).

In soybean culture, for instance, the practice of direct planting (or 'no-tillage')[207] means that crops benefit from the process of nitrogen fixation and improved soil maintenance, as well as more carbon sequestration (Embrapa Agro-Energy official, 2012; see too Carvalho et al., 2009)[208]. Therefore, "the increase in productivity due to technological innovation means gains in energy efficiency and reduction of environmental impacts, because a smaller area is being used for the production of food and energy" (Embrapa Agroenergia leaflet, 2011: 5; see too Goldemberg and Guardabassi, 2009 and La Rovere et al., 2011).

For its part, PNPB needs to focus more on other oil-bearing crops in order to fulfil its quest of identifying diverse sources of high energy density (e.g. oil palm produces in one hectare what soybeans produce in eight to ten hectares). So if the results of research by Embrapa Agro-Energy were to be implemented, in time there would be less need for land for biodiesel feedstock production. Besides, an assumption already exists that second generation biofuels (with research taking place in Embrapa Agro-Energy) will be deployed thus sparing the need to use further agricultural lands (Embrapa Agro-Energy official, 2012).

A number of leading academics agree that the most appropriate way forward for increasing production without more deforestation would be to increase efficiency, especially of cattle ranching (Lapola et al., 2010; Macedo et al., 2012). Barreto and Silva (2013) for instance, estimated that it would be possible to attain the levels in meat demand projected for 2022 by increasing the productivity of pastureland by 24%. The intensification of cattle ranching is already a reality in some regions, as the Ibama official in Sinop (2012) had described "closed, confined cattle, something that we didn't see before".

Lapola et al. (2014) and Macedo et al. (2012) highlighted the 'de-coupling' movement in agricultural expansion (cattle and crop) and deforestation since the mid-2000s (see Figure 6.7) and the crucial factor of intensification in cattle ranching. But the trend in recent years towards less deforestation in the Amazon coupled with soybean production and an increase in cattle herds is a reflection not only

[207] According to the official, soybean productivity is higher when direct planting is used. In fact, the old technique of soil revolving, imported from the European and American contexts, is not suitable for Brazil. Instead, direct planting is employed – the direct sowing of soybean immediately after the crop is harvested, so the organic matter of the residues can be used by the new crop.

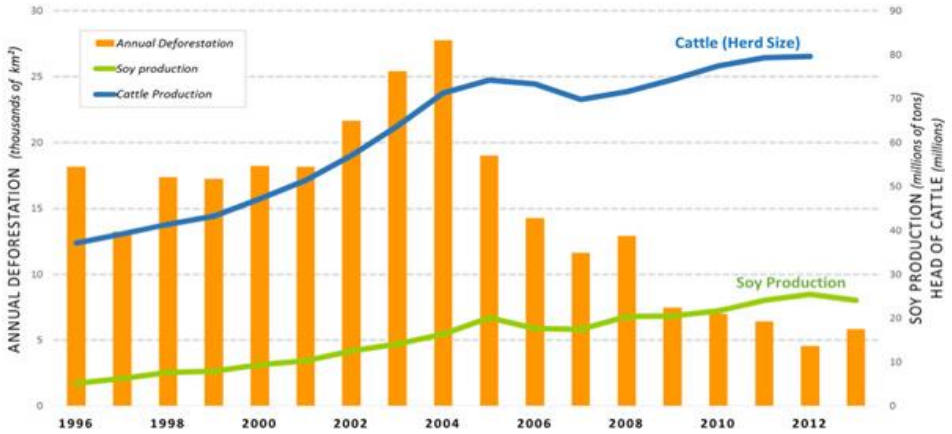
[208] Carvalho et al. (2009), in a case study from the state of Rondônia have compared soil Carbon stocks of cropland soils under no-tillage, conventional cropland and non-converted cerrados. They found that the no-tillage croplands had generally higher Carbon storage compared to native cerrados and conventional cropland. The authors stressed however that the data did not include the full Carbon balance in soil management changes.

of increasing productivity in agriculture but also of more 'successful' deforestation control policies (governance-driven declining deforestation rates, see Chapters 5 and 8), and sector-oriented policies such as the Soy Moratorium (Macedo et al., 2012).

The so-called 'de-coupling' effect should therefore be looked at with caution as it may simply be the inevitable outcome of more stringent deforestation controls following the implementation of the PPCDAm that has forced cattle farming to intensify and sugar cane/soybean cropland to expand into degraded lands.

If so, this consequence may be short-lived as the new Forest Code provisions of 2012 attach fewer restrictions; the recent spike in deforestation may well be linked to this. Furthermore, lower investment in deforestation control enforcement (Dilma Rousseff's reduction of the amounts dedicated to deforestation control may be a warning sign), and the discontinuation of voluntary mechanisms such as the Soy Moratorium (already said to end as new Forest Code provisions would be 'sufficient'), may imperil the relatively 'positive' results of deforestation reduction of the late 2000s. An analysis of more recent deforestation and cropland data should hence help produce a better understanding as to whether or not there is a real 'de-coupling' in the Brazilian Amazon.

Figure 6.7 The current trend in the Brazilian Amazon. Is agriculture getting more 'sustainable' and 'efficient'?



Source: Governors' Climate and Forest (GCF) taskforce, in Mongabey http://news.mongabay.com/2014/08/governors-pledge-massive-cuts-in-deforestation/, accessed 4 September 2015.

This means that a blind belief in ecological modernisation and allowing the market to 'self-regulate' will not guarantee control of deforestation, particularly under increasingly uncertain political conditions (see Chapter 5). As Lapola et al. (2014) have warned, agricultural intensification and its increased

economic attractiveness may lead to expansion, rather than contraction of cultivated and grazing land. Similarly, Marchand (2012) has analysed the relationship between technical efficiency in agriculture and deforestation in the Brazilian Amazon and concluded there would be a U-shape effect. This means that both less and more efficient farms clear more land for their agricultural production. The author argues that the majority of farms would now be on the ascendant slope, i.e. efficiency would imply more deforestation. This U-shaped effect would be the result of the low environmental value of the Brazilian forest, associated with the chronic uneven land distribution in Brazil and the fact that much forest and 'unproductive' lands are open to occupation (Marchand, 2012).

Various NGO representatives have expressed their concern over a naive belief that 'ecological modernisation' of agriculture by itself is going to solve the issue of deforestation. As far as integrated crop-livestock-forestry systems are concerned, apart from *Eucalyptus* sp. and other monocultures, there would be no other profitable use of the forest (ISA member, 2013). Furthermore, how could these systems compete with soybean prices?

> How can we, in a region such as that one [the BR163 soybean highway], effectively stimulate different productive systems? That is the key question. And that is not trivial… it does not depend on the will of one or another person. Either these guys are effectively stimulated and receive support corresponding to what they would have if they deforested or all these statements [crop-livestock-forestry systems] will end up being an altruism lasting only three or four years (ISA member, 2013).

6.4 Summary

This chapter has investigated concerns over the impact of biofuel on deforestation in Brazilian biofuel policies and practices. It has shown that these have not been taken into account in the PNPB as acknowledged by government officials and industry representatives given its national market orientation and priority for social inclusion.

The only Federal mechanism addressing land-use in the sugar cane ethanol sector is agro-ecological zoning, established by the federal government and showcased internationally as an example of sustainability. Although it has removed the Amazon, the High Paraguay River basin and the Pantanal from future expansion plans, the zoning is ineffectual (as it is mostly a funding conditionality) and

does not apply to existing plantations. Heavily contested in Mato Grosso, this Presidential initiative is being discussed in the Federal Legislative with an eye to its watering down.

The chapter has also critically analysed the five main discourses legitimising the omission of land-use concerns in biofuel policies: that the PNPB does not drive deforestation only the international soybean market; that dLUC does not happen as a result of soybean or sugar cane expansion; that iLUC is impossible to prove; that there are extensive reserves of land namely degraded pastureland on which to expand; and that ecological modernisation in agriculture makes production less land-intensive.

The biofuel land-use issue is indeed highly complex due to the inter-relation of different markets (e.g. cattle, soybean) and policies (biofuel, agriculture, rural development) and land-uses, underpinning a necessary caution regarding the land-use effects of biofuel production. However, scientific uncertainties and the reliance on macro-level assumptions have helped legitimise biofuel expansion.

Overall, these claims are rooted in a historic perception about land availability and use in 'the frontier', in Brazilian geopolitical representations of land abundance, and in an uncompromising belief in technology as a means of counter-posing concerns over land-use. They tend to ignore the existing and historically-rooted unequal land tenure that 'complicates' the assumptions about the availability of degraded land to expand on. Therefore, the fuel-food-forest triad contradiction, even in land-abundant Brazil, is considerably significant. Furthermore, the promise of these degraded lands to allow for biofuel expansion without touching on the Amazon forest is predicated on macro-level assumptions and 'wishful thinking', as decisions on whether and how to expand remain a private matter and hence are shaped by market and policy signals, as the next chapter explores.

Chapter 7. **Biofuel land-use dynamics**

The spectrum of arguments over land-use depicted in the previous chapter illustrates the nature of the political debate around biofuels. Yet academic research has rarely drawn on local empirical data to build more insightful explanations here. What do farmers on the ground actually have to say about it? Can the farmers' own land-use trajectories (embedded in highly specific socio-dynamics) cast light on those macro-level assumptions?

Two case studies - one on biodiesel derived from soybeans, the other on ethanol derived from sugar cane - explore how, in these particular contexts, land-use is shaped not only by political, institutional, and market forces working at the macro-level, but also by decision-making conducted at the micro-level (Pacheco, 2012). There is here an array of institutions (including property rights and contracts) interacting with organisations (e.g. cooperatives, firms), with no deterministic outcome (Jepson et al., 2010).

The role of local agency is crucial so it is important to understand the logic of actors and their motivation, both of individuals and groups, to better grasp the land-use effects of biofuels (Castro, 2005). But as Browder et al. (2004) highlight, there is a basic lack of understanding of the contributory factors shaping farmers' decisions on land-use which are often complex and diverse. These are mediated by factors such as land availability, available technology, output prices, local biophysical factors, knowledge and information, or even environmental policy. Further complications arise in the case of biofuel development where there is interaction between industrial and agrarian policies.

This chapter thus seeks to ascertain the configuration of social and political relations in biofuel production, and how this in turn relates to land-use, as part of an analysis that addresses RQ 3. It first examines the socio-economic dynamics of biodiesel production from soybeans in Case Study 1. In doing so, it assesses the ‘social contradictions’ of the PNPB and their land-use consequences. The chapter will then turn to ethanol production deriving from sugar cane in Case Study 2 where a different institutional context, land tenure structure and set of land-use practices reveal distinctive biofuel-induced deforestation drivers.

7.1 Case Study 1: The PNPB and expanded soybean monoculture

As seen in Chapter 6, the legislation supporting the PNPB lacked environmental provisions, so the land-use impacts from soybean production for biodiesel remained largely unaddressed. Given that nonetheless the PNPB claims a low impact on land-use, understanding what is happening in the field is therefore key to ascertaining the potential for the PNPB to reduce GHG emissions. Hence, this section explores the local socio-political dynamics surrounding biodiesel production in Case Study 1 to ascertain how it shapes land-use dynamics.

7.1.1 Local socio-economic dynamics and four social contradictions of the PNPB

As I drove along the BR163 and BR142 roads, soybean fields dominated the landscape as far as the eye could see (from October to February, then replaced by maize in the alternate season or *safrinha*, see Figure 7.1). Nova Ubiratã, while not located directly on the BR163, was nonetheless now, along with Sorriso and other thriving cities along that road, a great soybean producer.

Figure 7.1 Monoculture landscapes in Nova Ubiratã: on the left, soybean plantation (from October to February), followed by maize plantation in the *safrinha* (on the right).

Source: the author (November, 2012; July, 2012).

It is in this setting that family farmers from Coopertã have been participating in the PNPB's social fuel programme since the 2009/10 harvest. The cooperative (see Figure 7.2) was created in 1999 and now represents 64 farmers, comprised of 60 family farmers (including agrarian reform settlers) and 4 large landowners who are now focusing on soybean production. Mirroring what Stattman and Mol (2014) found in a Bahia case study, the PNPB in Nova Ubiratã has helped Coopertã to improve its organisation and the types of support it gives to members, including technical assistance. Since 2009,

the PNPB has generally favoured cooperatives, which has thus boosted Coopertã's influence and authority, especially in its intermediary role between farmers and industry (Coopertã President, 2012).

As seen in Chapter 4, there is a wide spectrum of biodiesel industry arrangements in the region. For example, Coopertã was working with the firm Caramuru, whose biodiesel unit was located in the city of São Simão in the neighbouring state of Goiás. This unit is supplied by 'social biodiesel' soybeans from Coopertã, the rest of the feedstock (85% from non-family farming) being produced by farmers in Goiás (Caramuru employee, 2012; Coopertã President, 2012).

Figure 7.2 The Coopertã office in Nova Ubiratã city centre.

Source: the author (July, 2012).

By signing social biodiesel contracts with industry, the cooperative receives R$ 1.2 per soybean bag traded, a resource used for its maintenance and organisation (Coopertã President, 2012). This arrangement with industry brings additional benefits for Coopertã farmers: free storage of soybeans (provided by Caramuru, it would otherwise cost farmers 3.5% of production) and an easier and more advantageous financing scheme for lime acquisition (needed for the correction of the acid soils of the Cerrado for soybean production) (Coopertã President, 2012; Farmer 1, 2012; Farmer 8, 2012).

Cooperatã also provides technical asistance to farmers - I witnessed several visits of Coopertã's agrarian engineer to farmers' holdings - thus providing practical help tailored to their needs and reducing dependence on industry (see below more on the industry 'packages').

Notwithstanding the role of Coopertã in supporting its members, it was the Nova Ubiratã Rural Workers Union (NURWU) who participated in the negotiations with industry in the Biodiesel *Pólo*

Médio Norte (see Chapter 4) as a result of which it was agreed that additional compensation would be given by the industry to family farmers (currently at R$ 1.2 per soybean bag).

Indeed, there seemed to be a 'competing' role between Coopertã and the NURWU over the 'protection' of family farmers' interests in negotiations with companies. According to Coopertã's President, the Union failed to have the R$ 1.2 compensation increased further for farmers in the latest round of negotiations. In effect, this amounted to a one-sided gain for the biodiesel companies who had enjoyed increased returns from higher prices fetched in the market for soybeans (Coopertã President, 2012).

The President of Coopertã stated:

> The FETAGRI [Federation of Agriculture Workers of Mato Grosso] is for the 'small farmers', but it demands a lot from us [Cooperative], it imposes the NURWU [the Union of the 'small farmers'] on us, but it never brought any benefit for us, no explanation, nothing. I prefer to rely on the Union of Rural Producers, which is the Union of the 'big farmers'. The 'small farmers' one does not solve any of our problems…
>
> [why, is Union of the 'big farmers' better organised?]
>
> Yes. And also where there is money, there are solutions. They work more on concrete stuff (Coopertã President, 2012).

Agrarian class struggles seemed to be underlying the Coopertã-Union disputes, and this was having a significant impact on biofuel dynamics on the ground. These agrarian struggles rooted in social class and ideological perspectives seemed to mirror the long-lasting agrarian conflict in the Brazilian countryside, reflected at the national level (CNA versus CONTAG and MST) or even inside the federal Executive (MAPA versus MDA) [209].

In Nova Ubiratã the disputes related to which union could win over small farmers to their side, who would oscillate between the Famato (Mato Grosso Federation of Agriculture, the big landowners lobby) and its local subsidiary the Union of Rural Producers (the Union of 'the big farmers'); and the FETAGRI and its local subsidiary, the NURWU (the Union of the 'small farmers'). When asked whether Famato had any appeal for small farmers, Coopertã's President confirmed it had, but said

[209] These divisions among farmers corresponded to ideological fault lines that can also be identified at the international level where the Federation of Agricultural Producers (IFAP) clashes with Via Campesina on the issue of biofuel development - the former sees it as an opportunity, the latter sees a threat (Borras et al., 2010).

that the opposite was also true, i.e. the NURWU's persistence in campaigning for farmers to join their union was also having some effect: "they are calling, right? Each one tries to attract farmers" (Coopertã President, 2012). Coopertã's competition with the NURWU regarding the local implementation of the PNPB may be an indication that the cooperative was closer to the Famato, something that was strongly inferred by the Coopertã President (2012) and also by the presidents of the Rural Producers Union (2012) and of the NURWU (2012).

In order to understand NURWU's stance on the implementation of biodiesel policies, it is perhaps worth noting that rural unions in Brazil have a distinguished record of campaiging for agrarian reform. With the more recent technological modernisation of agriculture, rural unions began to re-direct their attention to the actions of the private sector (e.g. by challenging the power and influence of the big agro-industries and the exclusion and displacement of poorer farmers). The Pronaf (governmental fund for 'family farmers', see Chapter 4) became the main source of political legitimation of rural sindicalism since in order to gain access to rural credit, farmers need a *Declaração de Aptidão* (or DAP - a document conferring 'family farmer' status), which is in turn determined by the Rural Workers Union (Abramovay and Magalhães, 2007; Coopertã President, 2012).

Later, the PNPB brought a newer source of legitimation for rural sindicalism as, by participating in the negotiations with industry, unions have had an opportunity to influence the way the market is organised and to determine, to some extent at least, the prices paid to family farmers (Abramovay and Magalhães, 2007).

The NURWU has another significant function: it has been responsible for setting up all the social biodiesel contracts between industry and the farmers (including the contract between industry and Coopertã), a prerogative which is of major concern to Coopertã's President (2012). The strengthening of the NURWU brought about by its special role with the PNPB was highlighted by its President:

> Biodiesel was a very good thing, and why? Because it has strengthened the Union, today we can face the Agro-industry, in meeting with big companies' representatives I can defend my proposals… they need the farmers [for attaining the minimum 15% of soybeans from family farming in order to get the social biodiesel stamp] (NURWU President, 2012).

Given historical agrarian struggles and the role of agrarian movements therein, this new configuration between unions and industry prompted by the PNPB is unusual and indeed, is a matter of some controversy in rural social movements (Abramovay and Magalhães, 2007). Interesting links between the union and companies have developed. For instance, the NURWU President admitted that, in order to facilitate union recruitment, he negotiated an arrangment with Agrosoja (an industrial company working on the social biodiesel programme with agrarian reform settlers from the agrarian reform settlement Paratininga), for them to pay the union dues on behalf of those settlers (a total of 46 new members), who were however, unware of the agreement (the President showed me all their files and their union cards) (NURWU President, 2012).

The PNPB's aim of social inclusion thus promoted the creation of novel links between actors at the local level hitherto on opposing sides. Rather than pursuing ideologically-driven hostility to agribusiness, rural unions thereby seized this opportunity to strengthen their position (Abramovay and Magalhães, 2007)[210]. This 'pacification' of rural movements may have contributed to relatively low rural opposition to biofuels in Brazil (see Stattman and Mol, 2014, for a Bahia case study).

The Cooperative and the Union were the two key organisations in the local implementation of the PNPB, with an intermediary role between industry and individual farmers, thus shaping the social context in which farmers make decisions over production and consequently, land-use trajectories. An insight into Cooperative-Union dynamics is important for understanding the drivers of place-specific land-use practices and outcomes (Jepson et al., 2010). However a comprehensive account of biodiesel land-use drivers needs a further element: an analysis of farmers' holdings and what happens there.

Given fragmented production, and since there is no single inventory of soybean plantations for biodiesel production, tracing farmers who are engaged in the process of biodiesel production is not straightforward, a problem that is widely recognised (MDA official, 2013; Coopertã President, 2012; Rural Producers Union President, 2012)[211]. However, by selecting a cooperative working under the

[210] Some elements of rural social movements, such as the Landless Peolpe Movement (the MST, see Wolford, 2010), however, are opposed to closer links with industry preferring instead to have their own production system for biodiesel (Abramovay and Magalhães, 2007).

[211] An interesting fact is that most soybeans used for biodiesel production are GMO (including most Coopertã's farmers) and are processed in the country while 'conventional soybean' is normally exported raw, as it has a higher value especially in Europe (Coopertã President, 2012; Caramuru employee, 2012). These need different storage facilities to avoid mixture. However this does not solve the issue of tracking soybeans upstream towards individual farmers. Furthermore, it represents an interesting, yet understudied socio-environmental outcome of the PNPB (fostering GMO crops).

PNPB's social stamp, it was possible to make contact with individual farmers (see more on this in Chapter 3) and simultaneously acquire an understanding of their perspective on land-use and deforestation as well as a detailed insight into their contract agreements with industry.

Although it is the case that farmers with larger holdings (defined as bigger than 360 hectares in this case study) are not entitled to participate in the PBPB social stamp scheme (the other 85% of the supply), and hence cannot be tracked, I expect that the information gained from this case study will provide a useful basis from which it will be possible both to grasp at least some of the complexities, and hence arrive at some conclusions about the overall land-use implications of the PNPB. This will complement the existing, yet very limited literature on the land-use impacts of the PNPB. Lima et al. (2011) Mato Grosso case study, for instance, fell short of providing explanations for the decisions taken by farmers, due to the problem of tracking soybean holdings for biodiesel production.

From the 64 members of Coopertã, I succeeded in interviewing ten family farmers, either on their land or at the headquarters of Coopertã in Nova Ubiratã city centre (see Chapter 3). The farmers as a group were a representative sample of the diversity that exists within the membership of the Coopertã in that they had been attracted to settle in the region at different intervals in the recent past on account of various government incentives and they currently managed a range of different-sized holdings.

Seven were 'traditional farmers' (meaning those who came to the region in private colonisation projects in the 1980s) and three were agrarian reform settlers from the Cedro Rosa *Assentamento* (agrarian reform settlement). Holdings ranged from 36 to 73ha in the case of agrarian reform settlers and could be as much as 1500 to 1800ha in the larger traditional farms. They all referred to soybean production as the main activity in terms of both production and land-use (with especially corn, or other crops such as cotton or bean in the *safrinha* or second harvest), and some also had cattle as a secondary activity.

Three of the ten farmers rented out their lands with two of them earning an income from other activities (i.e. in the city centre). Still, they were considered 'family farmers' and benefitted from the PNPB's social endorsement as they sold soybeans to biodiesel producers, although they had not grown the soybeans themselves, but had received them as rent for their land. So the crop could be produced in family holdings but not necessarily by family labour (Aracri, 2011).

This is what I would describe as the first social contradiction of the PNPB: benefitting from the programme without directly undertaking the activities involved in farming. It also raises a controversial question over the definition of 'family farming' - a classification mostly used for the implementation of the PRONAF (see Chapter 4) - contrasting with the 'peasantry', particularly since the issue of the representation of the poorest class of farmer is closely connected with the historical struggle for land in Brazil (Martins, 2002; for more on the discussion of 'family farming', 'peasantry' and 'agribusiness', see Abramovay, 1998; Silva, 2007; Fernandes et al., 2012)[212].

This social contradiction was also identified by others: for example, the Ibama official in Sinop (2012), the ISA member (2013), the NGO Repórter Brasil[213] and by scholars such as Schlesinger (2013). Furthermore, Reporter Brasil has unveiled cases of corruption in Mato Grosso involving farmers, rural unions (responsible for the oversight of the contracts) and the industry - in order to have more 'family farmers' under the social biodiesel stamp, biodiesel companies were buying DAPs from agrarian reform settlers not involved in soybean production.

The fact that farmers who were benefitting from the PNPB's social stamp were renting out their lands to the larger soybean farmers means that in these cases, the PNPB effectively had become a vehicle for enabling soybean agribusiness to expand into the smaller farmers' holdings. This constitutes a reminder that land access and ownership (the 'access regimes', see Jepson et al., 2010, and their case study in Eastern Mato Grosso) is a crucial factor for understanding the complexity of local biodiesel land-use dynamics. These include land lease contracts allowing farmers to extend production without formal ownership; likewise production contracts were being struck between farmers and industry, which will be explained below. Ultimately it could be considered another form of 'accumulation by dispossession' (see Chapter 2) in which agribusiness manages to get control over larger agricultural areas by inciting smaller farmers to rent their lands.

A second social contradiction relates to the 'family farming' concept. In fact, a number of households corresponded to several 'family farmers', as larger properties had been divided among the father and sons so that each parcel of land fell within the definition of 'family farmer' and hence each one could

[212] The 'peasantry' would differ from 'family farming' by its lesser degree of integration with the market (Veiga, 2012). Hence the modern family enterprise is not necessarily synonymous with 'small farming' or 'peasantry' (Abramovay, 1998) and may well constitute agribusiness.

[213] In Reporter Brasil, 2014, http://reporterbrasil.org.br/2014/10/agronegocio-da-soja-domina-producao-de-biodiesel-no-mato-grosso/, accessed 8 September 2015.

individually benefit from the PNPB. This meant that medium-sized farmers were benefitting from the PNPB social stamp scheme even if it was designed to support the smaller and poorer farmers.

A third social contradiction relates to the predominance of soybean cultivation – an export-oriented monoculture where economic viability is profoundly dependent on economies of scale and strongly based on large land holdings (Sawyer, 2008; Lima et al., 2011)[214]. As seen in Chapter 5, the main PNPB objective of social inclusion has been compromised since soybeans have become the major feedstock. The production stronghold of the soybean is in the Centre-West region, where Mato Grosso is located, and has gained the most, and hence not the semi-arid Northeast region with its impoverished small farmers cultivating castor bean and other oil bearing crops. And it was particularly along the BR163 – the 'soybean highway' – that agro-industrial units from leading TNCs and national corporations processing soybeans have flourished and then have been able to take advantage of the opportunities presented by the PNPB to increase their profits.

The PNPB's initial social inclusion objectives have therefore failed (Wilkinson and Herrera 2010; Bernardes 2011; Aracri 2011). A number of NGOs also share this view. As a Formad member told me, "by having 80% of soy as feedstock, the PNPB ended up helping to fix a monoculture in the region" (Formad member 2, 2012), while the ISA member (2013) argued that the PNPB objective of diversifying and developing family farming ended up becoming a "joke". Coopertã's President added that the "government has lost itself in the process" because the initial objective was to develop other crops but, "to sustain the project they had to adhere to soybean" (Coopertã President, 2012). Even former Governor and current Senator and soybean producer Blairo Maggi acknowledged the failure of alternative crops but that the PNPB was positive as it was sustaining the price of soybeans in Brazil[215].

The PNPB was therefore not only helping the soybean processing companies to make higher profits but was also promoting the expansion of soybean monoculture among 'family farmers'. In fact, I was told that since biodiesel production companies needed to fulfil the 15% compulsory supply by family farmers in order to obtain the social stamp and benefit from the PNPB provisions, they had initiated

[214] I interviewed one of the large landowners who was struggling to meet the debt payments for the acquisition of his land (R$ 1.5 million or US$ 0.4 million). He harvested at least 55 soybean bags per hectare from which he had to deduct more or less 10 bags for rent, plus machinery, workers, agro-chemicals, trucks, or storage of beans. Access to credit was therefore essential and maintaining large-scale production was fundamental for keeping the business running (see Chapter 4).

[215] During a public hearing at the Federal Senate, on 28 May 2015. Available at: *Agro olhar*, http://www.olhardireto.com.br/agro/noticias/exibir.asp?noticia=Blairo_cobra_regulamentacao_de_assentamentos_para_contribuirem_com_biodiesel&id=19623.

contact with agrarian reform settlements and family farmers in Mato Grosso to encourage them to participate in soybean production (Coopertã President, 2012; NURWU President, 2012)[216].

Evidence from the field suggests that the PNPB put pressure on industry to persuade family farmers and agrarian reform settlers to start planting soybeans (e.g. instead of continuing with subsistence farming) or to expand their already existing soybean production. I detected this in the Nova Ubiratã and Ipiranga do Norte municipalities[217] while other authors have also identified this tendency, such as Reporter Brasil (2010), Tocantins and Ribeiro (2011), Lima et al. (2011) and Schlesinger (2013). Using the same agricultural methods, participating in the same market, both traditional farmers and agrarian reform settlers end up being part of the soybean monoculture export-oriented tendency, together with large landowners, with the help of technological assistance by the biodiesel industry.

Given the impoverished conditions within some of the *assentamentos* in the region, the Coopertã President acknowledged the PNPB offered crucial support for those *assentados*, helping them to improve their living conditions. As Reporter Brasil stated[218], the PNPB brought new hope for those *assentamentos* in Mato Grosso whose plight had previously been overlooked by public policies. Given the ideological divergences shaping agrarian struggles in Brazil, it is ironic that the agrarian reform dream was finally being sort of accomplished with the help of soybean agribusiness.

As family farmers and agrarian reform settlers were being persuaded by the PNPB to concentrate on soybean production, they consequently fell into the economic and political sphere of influence of agribusiness. As Lima et al. (2011) have suggested, there would be an incipient class formation in agrarian reform settlements, driven by the high levels of income generated through economies of scale in soybean production. Regardless of the kind of farmer (big landowner, family farmer or agrarian reform settler), there was a shared cultural aspiration to become a major producer (Lima et al., 2011), leading to the above-mentioned movement of farmers towards the Rural Producers Union

[216] Abramovay and Magalhães (2007) added that as family farmers produce raw material for biodiesel with subsidised interest rates (the PRONAF), they are a source of cheaper soybeans.
[217] As explained in Chapter 3, before conducting my case study in Nova Ubiratã, I visited the municipality of Ipiranga do Norte. There, I interviewed the President of the Rural Workers Union, who told me about the social biodiesel programme and the role of industry.
[218] Reporter Brasil (2014), in http://reporterbrasil.org.br/2014/10/agronegocio-da-soja-domina-producao-de-biodiesel-no-mato-grosso/, accessed 8 September 2015.

at the expense of the NURWU, and to digressive arguments and accusations and counter-accusations[219].

The PNPB has allowed small farmers to "be looked at with the same value as those who plant 10,000 hectares or 50,000 hectares" (NURWU President, 2012). The greater profitability of soybean production has also meant that many family farmers are now exceeding the ceiling of revenue below which they can be classified as 'family farmer' (see Chapter 4) and hence can benefit from both the Pronaf and the PNPB. In spite of the threshold having recently increased in Mato Grosso from US$ 64,150 to US$ 85,540 per year[220], it would still be too low given the increasing productivity levels, according to Coopertã's President (2012). And indeed, with the price of the soybean bag at US$ 17.64 (R$ 66) when I was in the field, most farmers from Coopertã would already be above this limit[221].

Soybean expansion was fostered by biodiesel companies in order to obtain the necessary quota of family farmers so that they would satisfy the eligibility criteria for the 'social stamp'. This quest, whereby these companies 'help' farmers in return for growing soybeans in turn relates to the fourth and final social contradiction that I have observed in Nova Ubiratã: the loss of independence for family farmers that is an inevitable consequence of their accepting practical support from biodiesel companies, in the form of *pacotes* ('packages'). As Lima et al. (2011) have stated, the smaller farmers were 'adopted' by the soy purchasing companies, receiving interest-free loans to purchase equipment and input. The *pacotes* system consists of a company loan facility by which the company, often after its agrarian engineer has paid a visit to the farmers' holdings to determine specific 'needs', offers the producer a *pacote* of products and services (seeds, fertilisers, machine adjustment, raw material transportation to storage facilities, storage and technical assistance). This would ultimately constitute a *de facto* privatisation of credit and technical assistance.

[219] During my time at the Coopertã headquarters and when visiting holdings, I observed that the majority of Coopertã members were critical of the Rural Workers Union, its work regarding the PNPB and agrarian reform settlers in general (depicted as "lazy", and as taking advantage of governmental assistance programmes). This was especially relevant as during my research a municipal election campaign was underway, revealed a polarisation between big land-owners and the Rural Producers Union who were advancing more agribusiness-friendly policies and agrarian reform settlers, some family farmers and the Rural Workers Union who supported the PT, the party of the mayor then in office. Coopertã members mostly opposed the PT and the current mayor, and were in favour of the agribusiness-friendly candidate (who ended up winning the election).
[220] R$ 240,000 to R$ 320,000, currency rate of 9 December 2015.
[221] As bags produced per hectare averaged 50 in the Coopertã farmers I interviewed, on average these farmers had US$ 882 (R$ 3,300) of profit per hectare. Hence farmers with holdings bigger than 97 hectares would already be above the 'family farmer' income limit (Coopertã President, 2012).

Being a sort of alternative access to credit, the widespread use of *pacotes* (as seen in Chapter 4, these private credit mechanisms constitute 50% of the available credit for soybean farmers) has meant that a large proportion of funding for family farmers was now being privately controlled in a system of *equivalência-produto* (product-equivalent). The farmers' debts are repaid in a pre-agreed quantity of soybeans, which makes the process highly vulnerable to soybean price fluctuations in the international market (the Chicago stock exchange is indeed monitored every day by local farmers)[222].

Bernardes (2011) highlighted how this hegemonic role of the soybean companies reflected a lesser role of the State, as public technical assistance was mostly absent. The PNPB would then represent an example of the conflicting character of public policies, as its implementation would create unequal access to resources by different social segments, establishing asymmetric power-relations and generating more opportunities and profit for companies.

The *pacote*, in fact, would never be cheap, as "those companies are not benefactors [*boazinhas*]", said the representative of the regional development agency in Sorriso (Consórcio official, 2012)[223]. The companies would thus have the 'power of disposition' as they would control the distribution of technical and financial resources needed for production at the local and regional levels (Rio, 2011; Lima et al. 2011). Furthermore, as Rossetto (2011) too has highlighted, the situation is exacerbated by the nature of the dependency between the rural producer and the biodiesel companies, as the latter, besides capital, also have the unrestricted support of the local and State public powers (see more on Mato Grosso agribusiness political connections in Chapter 8).

Aracri (2011) provided examples of this type of dependence in a case study of Fiagril, a soybean processing company (and biodiesel producer) located in Lucas do Rio Verde, on the BR163 road. The author noted that it seemed essentially that the land they lived and worked on was being rented out to agro-industry (Bernardes, 2011; see too Repórter Brasil, 2010)[224], with a growing dissociation

[222] I heard reports of fortunes being made from farmers' soybeans in one day as a result of fluctuating prices on the international market. Houses, cars, lands, agricultural input, were all traded in soybean bags, the 'alternative' currency in the region, whose price was defined by the Chicago stock market. For more on the use of soybeans as currency in the region, see the article *Saca de soja é moeda corrente nos negócios,* in: *O Estado de S.Paulo*, 2 September 2012, http://economia.estadao.com.br/noticias/economia%20brasil,-saca-de-soja-e-moeda-corrente-nos-negocios-,125140,0.htm.

[223] As seen in Chapter 4, the *Consórcio* Alto Teles Pires is a decentralised body of the State's government in the region, intended to foster local development, mainly agro-industry.

[224] Furthermore, according to Repórter Brasil (in http://reporterbrasil.org.br/2014/10/agronegocio-da-soja-domina-producao-de-biodiesel-no-mato-grosso/, accessed 8 September 2015), this is creating friction between INCRA and the MDA in Mato Grosso. This NGO gave the example of the *Assentamento* Dom Osório, where Biocamp contracts with agrarian reform settlers masked the actual terms of land lease. This would be an illegal practice according to INCRA and contrary to agrarian reform laws, while for the MDA (to which INCRA is subordinated) it is acceptable within the parameters of the social biodiesel programme. Meanwhile, following an audit in 2012 the company suspended those contracts.

between the property of the means of production, and the control of production in its different phases (Aracri, 2011). The move from public to private sources of credit would change regional land-use patterns as it promoted the integration of production into global markets and the increase of soybean production (Jepson et al., 2010). This meant that the PNPB, designed by the Lula da Silva government to reduce rural poverty, would actually be furthering inequality and the subordination of farmers to agribusiness (Fernandes et al., 2010)

It was notable that every one of those I interviewed - the farmers, the President of the NURWU, the President of Coopertã', as well as the mayor - though acknowledging that the PNPB had brought benefits to farmers, nevertheless voiced strong criticism over the growing role and power of the biodiesel companies. They particularly regretted the lack of State support in terms of providing technical assistance and environmental licensing. However, I did not witness any public hostility to the biodiesel industry in Nova Ubiratã. Farmers seemed encouraged by the PNPB provisions (farmers 9; 10, 2012) as "it has technical assistance, and fertilisers and seeds arrive in the right time" (NURWU President, 2012).

7.1.2 The land-use consequences

These four intertwined 'social contradictions' of the PNPB mean that the success of its key objective of social inclusion is debatable since the main beneficiaries have been the biodiesel companies rather than the more vulnerable farmers. This in turn has a significant impact on land-use, fostering the expansion of soybean monoculture in family farming and agrarian reform settlements, and it likely leads to more deforestation as a further dLUC or iLUC driver (see Chapter 6).

Furthermore, the impact of the biofuel companies on the environment goes beyond promoting the expansion of soybeans. In fact, some farmers, even without an environmental licence[225] (and therefore without easy access to credit for soybean production) managed to gain the support of certain companies who would allow them to have access to credit through the *pacotes* (Consórcio official, 2012; Coopertã President, 2012). Castro et al. (2010) have acknowledged that these contracts are less bureaucratic, faster and require less paperwork (such as certificates, registries or land environmental licensing), compared to official credit mechanisms, as soybean companies sustain

[225] To be explained in more detail in Chapter 8.

their operations in informal relations and rely upon the reputation of the producer[226]. The PNPB would therefore allow farmers to 'by-pass' Forest Code restrictions through association with industry. Unfortunately I could not obtain the stance of the local biodiesel industry regarding these social and environmental contradictions (see more on this in Chapter 3). Do they acknowledge that by establishing social fuel contracts with family farmers they do not need to check the farmer's environmental legality[227]?

And what about the actual causal impact of the PNPB in farmers' decisions to deforest? Coopertã's family farmers have acknowledged PNBP support for them has helped make the soybean business more profitable such that they intended to expand their production, thus counter-posing the first claim noted in Chapter 6.3 that the PNPB could not be blamed for being a driver of deforestation (e.g., Farmer 5, 2012; Farmer 9, 2012; Farmer 10, 2012). Some have admitted to progressively clearing small fragments of forest in recent years (Farmers 6, 9 and 10, 2012). This is an indication that the PNPB was actually 'joining forces' with the other drivers of soybean expansion by encouraging farmers to cultivate the crop.

This was most evident among agrarian reform settlers who seemed the most satisfied with the PNPB. One settler from the *Assentamento* Cedro Rosa declared that, "the biodiesel programme is very good for us, producers. It solved my problems! Lula's government has helped a lot of family farming, he was the best President! I never had access to credit and now I have" (Farmer 5, 2012). Moreover, increasing the percentage of biodiesel in the diesel blend provided a rationale for further increasing production and this, in turn, encouraged other farmers to follow suit (Farmer 5, 2012; Farmer 10). Another settler from that *Assentamento* explained his ability to expand: "because of biodiesel! Before we could not plant soybeans in the agrarian reform settlement, but now with the government, with this biodiesel programme, family farmers are needed, so we started to produce soybeans" (Farmer 7, 2012).

But how is this expansion soybean - fostered by the PNPB and by biodiesel companies' *pacotes* - affecting land-use practices? As seen in Chapter 6, there is a strong conviction, shared by state

[226] This statement is particularly insightful given that the book where it was made was published by Embrapa.
[227] However, as seen in Chapter 6, the representative of the Union of Biodiesel Producers of Mato Grosso acknowledged this (Sindibio representative, 2012). Furthermore, according to Reporter Brasil (2010), in the case of Fiagril biodiesel unit (located in Lucas do Rio Verde), it was not only turning a blind eye to the environmental legal status of some of its suppliers but had also purchased soybeans from those included in the Ibama's blacklist of embargoed holdings which were banned for committing environmental crimes.

officials, industry and agriculture representatives, that deforestation occurs in a set sequence - logging, cattle ranching, soybean cultivation - so soybean production by itself was not perceived as a cause of deforestation. There is also a conviction that expansion is mostly done on plentiful pastureland or degraded lands.

The Coopertã farmers that I interviewed explained that clearing land for soybean production is a costly process as it takes time to prepare the land (a longer preparation [*carência*] period) so expansion mostly occurs on pastureland or degraded lands (Farmers 1, 8 and 9, 2012). Therefore land that has been brought to the point where it is ready for soybean cultivation is expensive and hard to find, especially given the more stringent deforestation control measures that were now in place (see Chapter 8). Indeed, land that has been cleared and made ready for soybean cultivation has become so valuable that some farmers had chosen to rent out their holdings and move to the city.

In the past, each farmer's land-use trajectory was different. Most of them had arrived in the 1980s and had gradually cleared their lands, firstly for growing rice and/or raising cattle; a few had been involved in logging. In recent years, many of the farmers had cleared forest only in the soybean phase. Some, especially the agrarian reform settlers, stated unequivocally that it was the PNPB who had provided them with the incentive to grow soybeans. The others had begun cultivating soybeans in the 1990s or as late as 2011, after an initial phase of cattle. Their reasons for clearing the forest were to secure the ownership of land or else to cultivate the profitable soybean.

At the municipal level, the trend has been a progression from timber to soybean, without a relevant intermediary cattle phase. In fact, the logging-cattle-soybean progression did not seem to fit well in Nova Ubiratã where the main economic activity was, until very recently, logging, but soybean was now the most important production (see Figure 7.3). The mayor acknowledged that the municipality, once an important timber producer, had seen its production decrease as industries had closed down, in part because of tougher environmental control by Ibama, but also simply because there was no more available profitable timber (he stated that the municipality was in a 'transition zone' and that the more profitable timber would be located deeper in the Amazon). The new development paradigm was now soybeans, while cattle ranching was diminishing (Nova Ubiratã former mayor, 2012).

In fact, the President of Coopertã' explained that, on arrival the farmers would normally embark on cattle ranching but he added that now, "cattle is finishing in the municipality" because of the high

returns to be had from soybean cultivation. Ideally they would like to expand their plantations but felt prevented from doing so since they would be required to operate in accordance with environmental legislation (see Chapter 8). So soybean cultivators would buy or rent areas already cleared to produce soybeans (the lease system in particular, was also identified by Lima et al., 2011), “So what is being sold now is going to turn into soybean plantations, and what is being rented out is going to become soybean fields in the same way. Those who have plenty of money to invest such as those big landowners, they will certainly apply that money in some place” (Coopertã President, 2012).

Speaking from personal experience, as one of the farmers who had finished with cattle ranching in favour of renting his land to a soybean producer, the President of Coopertã said that while some of the ranchers had moved on to another region with their cattle, many more had chosen his path. The process was “removing a lot of small farmers from the rural areas” who were more susceptible to inducements to rent or sell. “In my district [Santo Antonio do Rio Bonito], oh my God! There were so many people living there! It is over now, the small farmer is leaving towards the city” (Coopertã President, 2012; also Farmer1, 2012).

Lima et al. (2011), in their Sorriso case study, identified a similar pattern among ranchers, of their either switching over to the more profitable activity of cultivating soybeans or moving away to more remote areas to carry on ranching. This is related to the appreciation of land prices, a consequence of soybean monoculture expansion and the increase of foreign investments (Sauer and Leite, 2012). It also indicates that soybean expansion further promotes iLUC in the region.

Coopertã’s President described the case of a farmer he was acquainted with in the district of Santo Antônio do Rio Bonito who was buying up land wherever he could, buying smaller and smaller holdings:

> It is getting tougher … what is going to happen? He will end up buying all the remaining little fragments of those small farmers and in a year, two years he will be owning or renting 4,000ha… the smaller farmers are getting crazy, the money appears because those guys plant so many soybeans, and profit so much, right? (Coopertã President, 2012).

This means that the issue of land availability is inevitably intertwined with issues of land concentration and of the decisions of land holders rather than the macro-level scale abstraction depicted in Chapter

6. In fact, when asked about the promise of increasing production using only existing arable or degraded land, the Coopertã President expressed his views candidly: “In this municipality yes, in general, if you just restore those lands and plant, of course you would increase the production… but we must not think in terms of the municipality, we must think of the farmer, the individual. Each case is a case” (Coopertã President, 2012). Furthermore, he added that “the farmer is so greedy, but so greedy, that he prefers to buy 20 hectares of forest in the ‘frontier’ instead of maintaining his production in his already cleared lands… there are some farmers there, oh my God!” (Coopertã President, 2012).

Figure 7.3 Cattle ranching, degraded pastureland and vestiges of the timber industry in Nova Ubiratã.

Source: the author (July, 2012).

Hence, and while there is a trend of expansion of soybean on pastureland, the story is more complex. Given soybean’s high profitability, dLUC is indeed occurring and is seen as a great possibility of expansion. In fact, Nova Ubiratã’s newly elected mayor (2012 municipal elections) informed me that the municipality could produce even more soybeans, from the current 350,000/400,000 hectares to 500,000 hectares, by legally clearing the forest (percentage provided by the Forest Code): “we are

the sixth biggest producer in Mato Grosso but we will be able to achieve the third ranking because we still have areas to clear" (Nova Ubiratã mayor, 2012). Thus, despite the existence of degraded lands to expand, it was still considered 'necessary' to clear more lands, a 'need' corroborated by Coopertã's President (2012) and farmers (1; 3; 5, 2012).

Of all the official agencies involved, local environmental authorities are perhaps the best placed to explain the land-use dynamics associated with soybean production. The Municipal Environment Secretary asserted that the high deforestation rate in the municipality was due to soybean production and not to cattle or timber. She specified that the objective was to plant soybeans even if, in the first year, farmers planted rice. I asked her about the view prevalent among farming representatives and many government officials that direct deforestation was not occurring in this manner because soybeans were only planted in areas that had already been cleared, to which she laughed and said that rice was just a preparation for the soybean cultivation and that:

> No! Soybeans are planted and then on only soybeans, more soybeans, and each day more and more soybeans. Especially given the international price of soybeans. Look, they don't care, what they want is to clear more and more land, as soybean is giving a lot of money (Nova Ubiratã Environment Secretary, 2012).

Therefore, and notwithstanding the putative trend to expand on pastureland, dLUC from soybean occurred in Nova Ubiratã, as confirmed by farmers, the Municipal Environment Secretary, the Ibama official (2012) and environmental NGOs (ICV member, 2012; ISA member, 2013).

This 'expansion avidness' happens in spite of greater modernisation in production methods. (Consórcio official, 2012; Nova Ubiratã Environment Secretary, 2012). Farmers were now using the direct planting technique and double cropping resulting in increasing productivity and technological investment in soybean production, even if none of them was aware of the ABC programme (see Chapter 5) or Embrapa's integration programme (see Chapter 6). As the Municipal Environment Secretary (2012) said: "nowadays with technology you do not need to open new areas to have good results". But as seen above, this intensification does not always mean less deforestation although it could be argued that it could be much worse if it was not for the technological improvements of soybean production.

Overall, this section has shown that soybean monoculture expansion has significant effects on local land tenure systems, increasing land concentration and land prices. It has also shown that this has corresponding dLUC and iLUC effects. The PNPB would hence be here an additional driver of soybean expansion - notwithstanding its social priorities – and the particular farmer-industry arrangements (notably though the *pacotes*) allow farmers to by-pass Forest Code provisions. This means that the PNPB has significant land-use contradictions, which in turn are poorly addressed, as seen in Chapter 6.

7.2 Case Study 2: "consolidated" sugar cane production

Unlike the case of soybean production, sugar-ethanol production is of less importance in terms of the land-use and economy of Mato Grosso State and hence features less in its politics than either soybean or indeed cattle. Moreover, it has a lesser role in national sugar cane/ethanol production which is dominated by the export-oriented São Paulo UNICA (see Chapter 6). With logistical constraints related to transport, and the discouraging effect of the ZAE, it has not experienced an expansion as great as the soybean sector. Nonetheless, it provides invaluable insights that help to clarify biofuel local land-use dynamics.

The second case study is located in the municipality of Barra do Bugres in the high Paraguay River Basin and in the Amazon biome, hence in an area where new sugar cane plantations are not recommended according to the ZAE (see Chapter 6). Compared to Case Study 1, this municipality has a much older land-use history, predominantly of cattle ranching, resulting in a lower percentage of intact forest (see Chapter 4). While much more socially diverse than the first case study, it showcases the same tendency towards land concentration. Sugar cane monoculture, just as with soybean, increases land concentration as it requires sizeable holdings for mechanisation and to create necessary economics of scale in production, leading to the same income concentration and small farmer displacement referred to above.

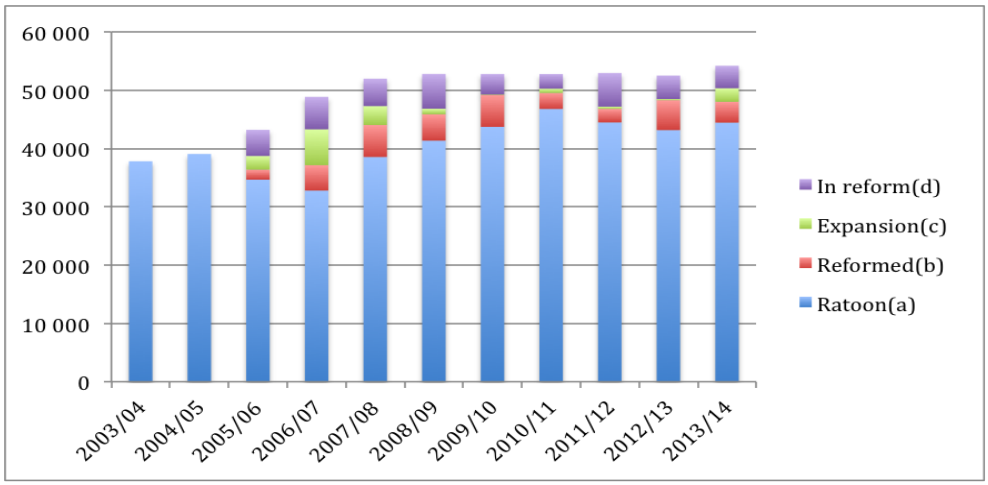
The municipality underwent a transition from cattle ranching to sugar cane plantation in the 1980s. The resulting out-migration of cattle ranchers from the environs of the Barralcool distillery, where sugar cane was thereafter planted, led in turn to the displacement of family farmers elsewhere (Schlesinger, 2013). Then in the late 1990s, with the re-emergence of the ethanol programme, there was further sugar cane expansion (Farmer 12, 2012; Farmer 14, 2012). Nowadays, there seems to be

a stable surface area in production (see Figure 7.4 and Figure 7.5) with 7.5% of the Municipality given over to sugar cane cultivation, making it the largest surface of sugar cane plantation in Mato Grosso municipalities (CanaSat, 2014)[228].

In addition, there is a different institutional dynamic here than in the previous case. Thus, unions had a smaller role in the sector, there was no 'Social Stamp' strategy, and there is also a different production and land holding structure, with predominantly large holdings surrounding the distillery (i.e., in a radius of 30km). Contrary to the previous case study, it was not possible to separate sugar cane farmers from the industrial unit as they are mutually constitutive (in that farmers have shares in it, plus most farmers' families were the creators of Barralcool).

This clearly contrasts with Case Study 1 where the production structure is more fragmented on account of complex industry-farmer arrangements and where the farming community and industry are distinct entities with their own interests and strategies, in spite of PNPB fostering to a certain degree a convergence. Furthermore, the 'consolidated' structure of plantations around the Barralcool unit in Case Study 2, meant that I did not experience *in loco* the sort of social contradictions or expansion of monoculture as in Case Study 1 – although it is conceivable that this could have happened in the past when Barralcool was established, directly or indirectly then forcing the displacement of smaller farmers, as Schlesinger (2013) noted.

Figure 7.4 Evolution of land-use by sugar cane plantations in Barra do Bugres, in hectares. Available for harvest = ratoon + reformed + expansion.

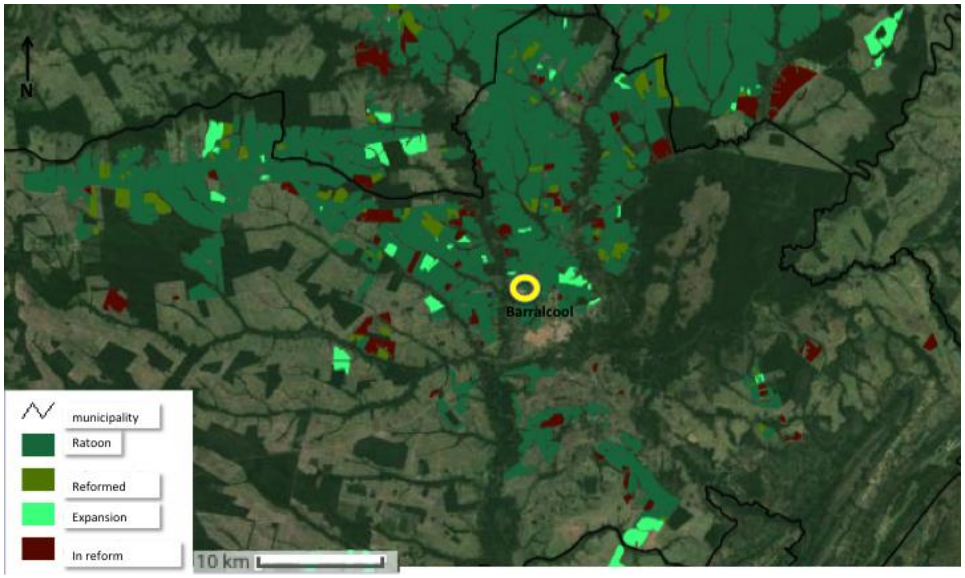


Source: Canasat, accessed 30 July 2015.

[228] In http://www.dsr.inpe.br/laf/canasat/index.html, accessed on 8 May 2015. As this is a joint project with the federal INPE, hence not just a platform implemented by the ethanol sector, I believe the data is reliable.

Further differences emerged through interviews. Thus, I interviewed eight farmers at Barralcool (at their holdings or in the city where some of them worked); but these were not family farmers, rather they were big landowners whose traditional activity was cattle ranching. Since the beginning of Barralcool in 1980 (which was set up by these farmers or their parents), they have been using some or all of their lands for sugar cane production, or in some cases even renting lands from other farmers, while keeping theirs for cattle. The size of sugar cane plantations (including their own lands and those rented from other farmers) was 1200 hectares on average and could be as much as 3000 hectares. The total size of individual holdings could however be still much larger, if pastureland and vegetation reserves were included.

Figure 7.5 Sugar cane plantations in Barra do Bugres municipality.



Source: Canasat, accessed 30 July 2015.

Unlike Case Study 1 where has funding targeted at 'family farmers' (Pronaf), and where assistance and technical packages were provided by industrial companies, here large amounts of credit could be obtained through the FCO[229] or the BNDES. They also possessed more machinery, sometimes used in Barralcool's *condomíno* (see Chapter 4), and although mechanisation had in general reduced labour needs, additional workers were taken on during the harvest (see Figure 7.6).

[229] The *Fundo Constitucional de Financiamento do Centro-Oeste* (FCO) was established in 1989 to finance productive sectors in the Centre-West region.

The provenance of farmers was different too. The interviewed farmers had arrived in the 1960s or 1970s (or were second generation farmers) mainly from São Paulo State in pursuit of cheap lands for cattle ranching (most of the families had previously been engaged in cattle ranching in São Paulo while others had been coffee producers there), whereas Case Study 1 farmers had come in the 1980s from the southern states (Rio Grande do Sul, Paraná and Santa Catarina).

Figure 7.6 Sugar cane plantation (top left) and sugar cane manual harvest.

Source: the author (November, 2012).

Alongside the other factors just noted, the disparate origin and identity of the farmers in the two case studies is undoubtedly a factor contributing to the local biofuel land-use dynamics. While identity was not an analytical focus in this thesis, my experience in the field led me to conclude that it is a factor worthy of more attention based on ethnographic research. Grasping how identity influences local land-use dynamics would be very insightful as particular representations of land and of 'modernity' are often used to contrast one group's activities (e.g. the *gaúchos* or the São Paulo *paulistas*) with 'other' groups' (see more on this in Chapter 8).

Most of the farmers in Case Study 2 had cleared their lands in the 1970s for cattle ranching and subsidiary activities such as rubber, coffee or rice. Sugar cane began to be produced on most of the

interviewees' holdings in the 1980s, with the beginning of Barralcool; while only two farmers did so in the 1990s. One of the farmers briefly described his land-use history:

> In a first moment deforestation was not for sugar cane but for cattle ranching. But from 1983, when we saw that the Barralcool project was being successful, we expanded our sugar cane area in 1985, 1986, 1990, and so on. In fact, initially we expanded on pastureland. We planted sugar cane close to the factory and moved the pastureland to bigger distances… as the factory would expand, we would take the pastureland for sugar cane and pastureland would move to a bigger and bigger distance (Farmer 14, 2012).

Such farmers are thus also cattle ranchers; indeed Barralcool was set up as an enterprise by a group of mainly cattle ranchers (Schlesinger, 2013). Sugar cane-cattle pairing is significant not only in terms of individual land-use dynamics but also as a livelihood shaper in the last 30 years where cattle represent a source of income especially during sugar cane/ethanol crisis periods:

> When times were bad, only the best distilleries in the country survived; it was more or less the period from 1992 until 2001 when the carmakers started to produce flexi-fuel vehicles. Then, in 2002 there was a boom in ethanol production. We only survived during those ten years because we had cattle backing us up… conversely, when the price of beef is lower, we use money from the sugar cane production (Farmer 14, 2012).

All had cattle when they moved into sugar cane production and all except two still had livestock in more distant areas of Barra do Bugres or other Mato Grosso municipalities (e.g. in Cáceres in the Pantanal or in Juína up in the north-west of the state) – underpinning a possible iLUC factor - either on land they themselves owned or had rented at the time of the interview. Most had maintained or increased their cattle herd over time, while simultaneously cultivating sugar cane, with the exception of one who noted that his cattle herd had diminished as he had not made a point of searching for new land.

Other local actors corroborated the general tendency here. Thus, the mayor observed that cattle had been displaced to more remote areas of the Municipality (Barra do Bugres mayor, 2012) with pasturelands now 30km away from the factory. In fact, sugar cane plantations were concentrated around the unit for logistical reasons, so that this area was mostly covered with plantations and cattle ranching and other activities consequently had been displaced (Schlesinger, 2013). Overall, the

number of cattle had decreased with the arrival of Barralcool but had expanded again from the late 1980s and was now fluctuating around 250,000, the same level as in 1980[230].

There is therefore a clear indication of iLUC in this case study, corroborated by farmers' land-use trajectories and authors such as Schlesinger (2013). But what about dLUC? The mayor of Barra do Bugres (2012) felt that deforestation was "something of the past" and all farmers acknowledged it had occurred in the past to make way for sugar cane plantations (Farmers 11, 13, 15, 2012).

The SEMA official in Tangará da Serra (a decentralised branch of the SEMA whose responsibility encompasses Barra do Bugres) verified that the history of deforestation is older, and the region had become more "consolidated" over more recent decades. Cattle ranching was a traditional activity on land cleared long ago, leaving behind "vegetation islands" here and there.

As for sugar cane, its negative impacts were now not as significant as they had been in the past. The SEMA official recounted how when he arrived in the region in 2002 it was common for fires to spread from the sugar cane harvest to the forested areas: "When I got here in 2002 I was so scared. The weather would be grey, cloudy, it seemed it was going to rain but instead ashes from sugar cane fires would fall here in the city" (SEMA Tangará da Serra official, 2012).

Yet in general dLUC was minimal. Most farmers maintained that there was no need to deforest in order to plant sugar cane on account of the high availability of degraded pasturelands (Farmer 12, 2012; Farmer 13, 2012; Farmer 16, 2012; Farmer 18, 2012). Again, this was corroborated by the mayor who drew attention to the ready abundance of pastureland especially in the remote areas of the municipality (Barra do Bugres mayor, 2012).

If deforestation was therefore apparently minimal, more stringent environmental controls introduced since 2004 had helped to achieve this (see also Chapter 8):

> No, it does not exist [deforestation]. Today it is difficult to do a deforestation project, very difficult to be approved, you understand? Especially here in Mato Grosso, very difficult. So what us farmers have been doing is using pastureland, degraded lands or Cerrado (Farmer 15, 2012).

[230] Data from IBGE's website: http://www.ibge.gov.br/home/estatistica/pesquisas/pesquisa_resultados.php?id_pesquisa=44, accessed 4 September 2015.

Pastureland and degraded pastureland thus became the only alternative for farmers as their holdings had reached the limit of what could be lawfully deforested: “most of it [expansion] is in pastureland. There is no such thing as having to deforest. In reality, there is no deforestation here, as everyone has their legal reserve which is APP protected and the rest is all being used” (Farmer 14, 2012). Another farmer stated that he had no more land to expand on, unless he were to terminate his cattle production; presenting a difficult choice between cattle and sugar cane. Moreover:

> Passing from cattle to sugar cane you can do it but from sugar cane to cattle it is difficult as you have the capital invested in the plantation, you cannot take that capital and transform in cattle…you would have to sell the area, buy a cheaper one, more appropriate for pastureland and put in the cattle (Farmer 15, 2012).

Besides these restrictions, any plan to expand (all farmers wished to expand their plantations) faced another sort of obstacle - the Barralcool quota system. In fact, some farmers had already reached the limit of the quotas: “Yes I have the desire to increase, from 10% to 15% the plantation. [By clearing the forest?] No, we have plenty of cleared areas; we just don’t have more quotas” (Farmer 17, 2012). Barralcool could only expand if it increased its installed capacity and that would now be difficult because of the ZAE (Barralcool engineer 1, 2012).

This means that under the current production structure (i.e. if plantation expansion is not foreseen) there are no major consequences for farmer decision-making arising from the ZAE (Barralcool engineer 1, 2012). However, most farmers nonetheless disagreed with sugar cane zoning even if they were not directly affected by the ZAE Plan. Farmer 11 (2012), for instance stated: “That question of being framed as Amazon forest is done by computer programmes… we have such a high productivity… so why should we be restricted by the ZAE?” Farmers depicted the ZAE as a political issue, reflecting the relative weakness of the sugar/ethanol sector of the state in comparison with the soybean sector. As Farmer 12 (2012) said:

> The ZAE, in my opinion, is about the lack of political power; our politicians are more connected to the agribusiness of grains [e.g. soybean]. We [sugar/ethanol sector] do not have a representative in the Senate, or in the Lower House, no one working for us to make it viable here.

Farmer 16 (2012) was more blunt and stated:

> The ZAE is absurd! It represents selling Mato Grosso interests to Europe. Because they have deforested a lot in Pará, for instance…Our political strength is weaker than São Paulo, than the Northeast… the strength of Mato Grosso only appears when it is the soybean sector at stake… you know why? Because our ex-Governor, now Senator, Blairo Maggi, is the biggest producer of soybeans in Brazil… so the fight is difficult.

The other farmers similarly placed the blame on the soybean sector for overshadowing the interests of Mato Grosso sugar cane producers. According to one farmer, production of ethanol at Barralcool had provoked significant deforestation, although he also implicated soybean production:

> Since the beginning of the distillery, there was a lot of deforestation. A lot of 'abnormal' deforestation. But it was not only sugar cane production; soybean production has cleared a lot of forest here in the state of Mato Grosso which made the state a bit like an 'outsider' of environmental law (Farmer 15, 2012)

There was a palpable sense of unfairness that the sugar cane sector had attracted a negative image on the international stage, as the farmers insisted, on account of the excesses of the soybean producers and cattle ranchers in the north of the state. It was 'others' who have deforested - "in Pará", "up north in the Amazon", "soybean producers", "extensive cattle ranchers in the north" (Farmer 15, 2012; Farmer 16, 2012; SEMA Tangará da Serra official, 2012; Sindalcool representative, 2012). A component of the identity 'fault lines' depicted above, this blame-game is indeed one of the aspects shaping the contestation of deforestation control policies on the ground, as is explored in the next chapter.

7.3 Summary

The chapter has connected the political dynamics surrounding biofuel to actual land-use exploring how local socio-economic dynamics relate to land-use in each case study. The kinds of farmers, the land tenure structure, the specific biofuel markets, financing mechanisms and policies (the social stamp in biodiesel; the ZAE in ethanol), and the way they interplay on the ground, all intervene here for the different land-use results in the two case studies. In order to better understand the land-use dynamics associated with biofuel production, this chapter has identified farmers' land-use trajectories and depicted farmers' perceptions of land-use, as well as tried to perceive how they make their land-use decisions.

Hence, in Case Study 1 a cooperative of family farmers in Nova Ubiratã is producing soybeans for the biodiesel industry under the social stamp mechanism. It is argued that the design of the PNPB and its implementation lead to four social contradictions related to the expansion of soybean monoculture which in turn constitute an additional driver of deforestation. It was also found that soybean expansion in the case study can locally induce dLUC and be a significant driver of cattle ranching displacement and appreciation of land prices, thus inducing iLUC.

Case Study 2 focused on sugar cane ethanol from the Barralcool distillery located in Barra do Bugres and has an older colonisation history meaning that dLUC seems now to be a residual phenomenon. Further expansion of sugar cane is believed to be possible on available degraded pastureland but in reality it is limited due to the system of Barralcool quotas and the fact that the region is zoned by the ZAE. The cattle-sugar cane interplay in Case Study 2 (and the significant role of cattle compared to Case Study 1) reveals a different sort of dynamics, as most sugar cane farmers were cattle ranchers before the arrival of Barralcool – and indeed still are. This interplay, in turn, has surely led to the displacement of subsistence family farmers in the past and most probably iLUC.

It was also found that, while not having their current production directly affected by the ZAE, farmers supplying the Barralcool distillery were hostile to that zoning plan, underscoring an environmental conflict arena that will be further explored in Chapter 8.

Overall, this chapter has shown that there are indeed biofuel land-use effects on the ground and, given the absence of effective environmental provisions in biofuel policies (see Chapter 6), the contradictions can only be tackled with an effective deforestation control policy, to be explored in the next chapter.

Chapter 8. **Deforestation control in Mato Grosso: a hurdle to biofuel production?**

As discussed in Chapters 6 and 7, biofuel policies tend to provide limited provisions for tackling the land-use impacts of biofuels. However, as with every agricultural holding, biofuel feedstock holdings are subject to the Forest Code which remains the major mechanism disciplining land-use in the Brazilian Amazon. The Amazon Deforestation Prevention Programme (PPCDAm), as seen in Chapters 4 and 5, has given a stronger emphasis on Forest Code compliance by improving coordination and command and control measures. In Mato Grosso these measures operate in conjunction with a state system of environmental licensing of rural holdings.

This chapter assesses how the resulting deforestation control apparatus impacts biofuel feedstock holdings locally, thus addressing RQ 4. It begins by looking at how the particular Mato Grosso deforestation control *panopticon* has been implemented, and then moves on to each case study, with particular institutional arrangements framing deforestation control. This not only provides data on the deforestation control specificities of each case but also enables a better understanding of whether the Mato Grosso system ends up disciplining biofuel crop expansion or not; and if there are any biofuel-specific deforestation control provisions. Here it will be explored not only how biofuel crop farmers are affected by deforestation control policies but also how they perceive these policies and eventually contest them. Lastly, the chapter will investigate how these farmers' perceptions can be framed in the general agribusiness discourses regarding deforestation control and the broader environmental disputes in Mato Grosso.

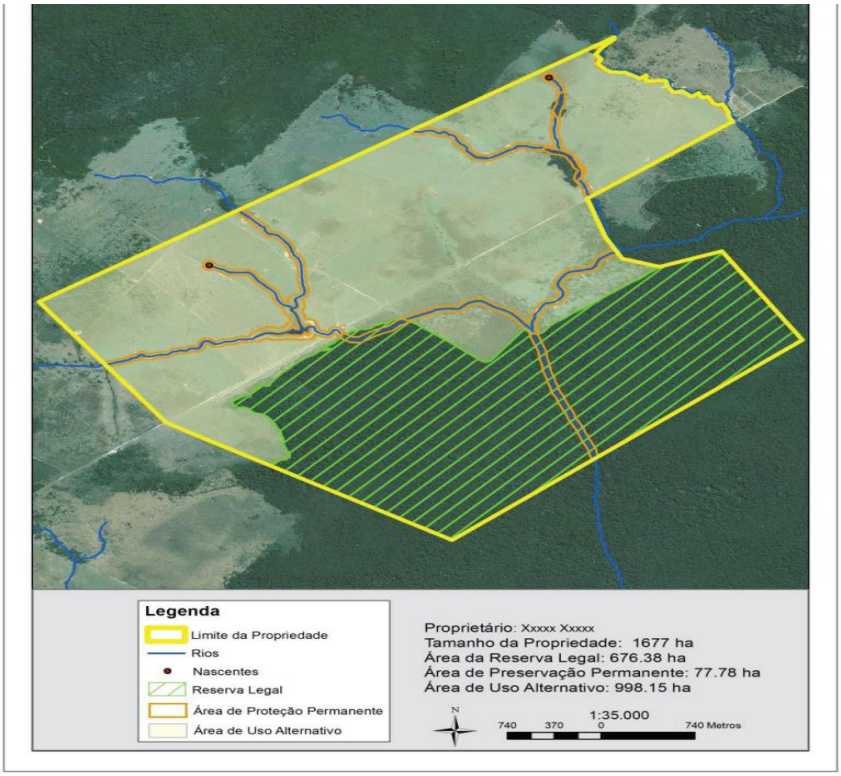
8.1 The Mato Grosso's *panopticon*: "bringing them into the system"

As Hecht (2011: 4) argues, there is a combination of politics, policies, practices and political economies shaping Amazon deforestation control; and multiple environmentalisms shaped by "local political economies, informed by differing scientific paradigms and managed by different political coteries, at different scales and articulated into global processes in different ways". Mato Grosso could be considered a paradigmatic example of that. A state infamously known for high deforestation rates and highly connected to international commodity markets has undertaken an 'innovative' step in creating a technological land-monitoring management model so as to environmentally legitimise

agricultural production. While this resulted in a complex and sometimes conflicting interaction with federal policies, the Mato Grosso system was nonetheless taken as a template by the federal government to build a nation-wide environmental cadastre of rural holdings (the CAR).

Being a global monoculture frontier with international attention devoted to assessing its deforestation levels, a particular deforestation control apparatus was developed in the state through what Hecht called a "new tropical panopticon" (Hecht 2011: 10). It was notably developed by the Maggi government (2003-2010) with the support of the international NGO *The Nature Conservancy* (NC)[231] and consisted of the remote-sensing and geopositioning of holdings, as well as land ownership data to monitor how private properties respected the legally-mandated protected forest areas.

Figure 8.1 The environmental licensing of a rural holding (perimeter in yellow): the green stripes represent the Legal Reserve (LR); in orange the Permanent Preservation Areas (APPs); black dots are water sources.



Source: *Observatório do Código Florestal*, http://www.observatorioflorestal.org.br/, accessed 13 November 2014.

[231] The Nature Conservancy (NC) is an American environmental NGO founded in 1951 and with offices in 35 countries, including Brazil where it has been present since 1988 (NC website: http://www.tnc.org.br/quem-e-a-tnc/index.htm, accessed 15 August 2015).

As a result of these innovations and their interplay with pre-existing Federal provisions scattered across diverse laws and agencies, disciplining land-use according to the Forest Code is a puzzling process in Mato Grosso. A series of (evolving and complex) legislation, policing apparatus, and institutional arrangements now exist at the state and federal level, often resulting in conflicts and/or a lack of coordination between them. This created in turn a situation that has deeply impacted the way individual farmers have been affected by deforestation control measures, as well as what they think about them.

It is not the objective of this thesis to provide an in-depth description of Mato Grosso's *panopticon* and how it evolved (but see Azevedo, 2009; Stickler et al., 2013). Very briefly, though, an environment licensing system of rural holdings (SLAPR) was created in 2000, following the de-centralisation of part of the forestry policy from federal to state level in 1999 and notably sparked by political concern over Mato Grosso's international image as the top deforester in the country. In order to get an environmental license for a given rural holding – the LAU (*licensa ambiental única*) - the legally required Legal Reserve (LR) and Permanent Preservation Areas (APPs) need to be mapped to a satellite image (see Figure 8.1). Any missing forest (when LR, which is defined as percentage of the total holding, or APPs are below the Forest Code provisions) must be compensated for by the land owner (e.g. by purchasing land in state conservation units and donating these to the state in the case of LR; missing APPs should be restored by planting native species or allowing natural regeneration). Upon complete documentation, the SEMA issues a five year valid LAU and a one year valid deforestation permit.

Given that the land holding structure in the Amazon has remained mostly undefined, and certainly not centrally controlled, the system developed in Mato Grosso using remote sensing and GIS was a pioneering one in that it could help differentiate legal from illegal deforestation, and even determine who was responsible for it. This could be seen as a real step forward as the PRODES monitoring system used by the Federal government to analyse yearly-accumulated deforestation (on the PRODES, see Chapter 4) is not able to distinguish between legal and illegal deforestation. The lack of property certainty has also been a great obstacle for deforestation control as it led to squatting and predatory deforestation, especially in federal non-allocated lands, where there is little possibility of punitive action. As seen in Chapter 4, this kind of illegal deforestation has been greatly tackled by

PPCDAm axis 1 (land regularisation) which has focused on conservation unit and indigenous land creation, as well as legalisation of squatting in federal lands (the *Terra Legal* Programme). Once the land structure in the Amazon is regularised (in Mato Grosso it is today mostly defined and privatised), the issue of controlling what is happening in each holding then becomes the main concern.

In order to be legal, i.e., to have an environmental license for their holdings, farmers need to respect the vegetation protection conferred by the LR and APPs. However, situations arise where the farmer may not have an environmental license despite having deforested below the allowed limit. This may happen when farmers cannot gather the papers necessary for the license and hence, felling on their land is considered illegal deforestation (what MMA official 2, 2013, called "the 'legalizable' farmer").

In this sense, it is crucial to attract farmers 'into the system' whether they have deforested above or below the limit. This was the main reason why the state government chose to split the SLAPR into two phases in 2008/9 (Maggi administration): a first phase with the new instrument CAR (Rural Environmental Registry) and then the LAU, within a state land legalisation programme called MT Legal (*Programa Estadual de Regularização Ambiental*)[232]. The CAR was intended to be a simpler process, with no need for official land titles, constituting a mere declaratory document in which farmers declared where their holding was, what LR and APP they had, and that they intended to proceed with the environmental license within 2 years. As the CAR of a holding would be formalised, its information would be visible in the SIMLAM system (*Sistema Integrado de Monitoramento e Licenciamento Ambiental*), the licensing and monitoring system of the SEMA[233].

The CAR was seen by officials and NGOs as a way of bringing farmers with illegalities relatively quickly into the system and a step towards the LAU (SEMA official 1, 2012; NC member, 2012). Deforestation control demands a good knowledge of who and where farmers are so that their activities can be monitored and their compliance with the Forest Code checked. The CAR was therefore essential to "attract people into the system so that the State could then easily monitor everyone" (NC member, 2012) and "what we need is to know who is responsible for that area, as if

[232] Complementary law nº 343, of 24 December 2008 and then regulated by Decree nº 2238, of 13 November 2009.
[233] Mato Grosso yearly deforestation rates have been oscillating around 1,000km^2 per year since 2009, down from 12,000km^2 in 2004 but it is uncertain if this trend is a result of the MT Legal or just mirroring the national tendency following the implementation of the PPCDAm (PRODES data in INPE's website: http://www.obt.inpe.br/prodes/index.php, accessed 12 May 2015).

something happens, it will be his responsibility… even if he does not hold a land title or is having difficulties with the LAU, at least he is registered" (SEMA Tangará da Serra official, 2012).

The arrival of smarter deforestation monitoring (see Chapter 4) allows for the Federal State to know exactly where and how deforestation is occurring, enabling a quicker reaction and enforcement on the ground: "You can see everything on the computer, in real time… if you ask me what is happening today in terms of deforestation I can tell you because we receive information every day with new images of deforestation in the Amazon" (MMA official 2, 2013). Adding this federal 'intelligence' to Mato Grosso's CAR, farmers get into the system and can be monitored and controlled. The State (notably in the form of Ibama) is then able to distinguish legal from illegal deforestation and as violators are identified, proceed with punitive measures. As the new Forest Code was approved in 2012, this command and control apparatus implemented in Mato Grosso was used as a template to implement a Federal CAR all over Brazil[234].

However, while conducting my field research in 2012, the Federal CAR had not yet been implemented and questions regarding the coordination between the Mato Grosso CAR and the new Federal CAR remained unanswered (notably the compatibility of the two registries and uncertainties regarding new regulations on the Federal CAR, still pending)[235]. As seen in Chapter 4, conflicts between institutions regularly occur due to the overlapping and contradiction of legal mandates, generating a climate of insecurity and juridical instability. As a MAPA official (2012) acknowledged: "It is complicated, I shouldn't say this but sometimes it is conflictive from an environmental point of view because the Brazilian environmental legislation is concurrent. And in fact we have that problem of delimiting who does what in environmental policy". Inter-institutional dynamics, following the decentralisation of most policies and given the specificities of Mato Grosso's socio-economic and political context – notably a high incidence of agribusiness interests in state politics - have a significant interplay in the licensing and deforestation control process.

Hence, doubts arose regarding the capabilities of the Mato Grosso state environmental department – the SEMA, responsible for the environmental licensing of rural holdings and for checking if

[234] As of May 2015, about 70% of the agricultural area of Mato Grosso state had been registered in the CAR, while the national figure was 52% and the deadline for farmers to adhere extended to May 2016 (*Observatório do Código Florestal*: http://www.observatorioflorestal.org.br/, accessed 4 May 2015).

[235] Now that a federal CAR system has been implemented, following the new Forest Code (Law 12.651/2012), it is still uncertain how the Mato Grosso SIMLAM system will evolve, i.e. if it is to be discontinued and replaced by the federal one called SICAR. The SICAR only came into place in 2014, when an online platform was opened for land holders to file their CARs, by the deadline of May 2015, which was then prorogued until May 2016.

deforestation is legal or illegal – *vis-à-vis* enforcement by the Federal authorities – notably through Ibama, responsible for the overall surveillance and control operations, in conjunction with the Federal Police and the judiciary[236]. These doubts concern SEMA's 'incapacity' due to a lack of means or even of political will, as it is criticised for being easily influenced by Mato Grosso's agribusiness interests (ICV member, 2012; ISA member, 2013; Formad members 1 and 2, 2012; SEPLAN official, 2012; SEMA official 2, 2012). As a MMA official (#2, 2013) noted, some states, such as Mato Grosso, were simply less willing to collaborate in deforestation control. The overall tone in Mato Grosso is of Federal intrusion in the state's interests, following a long history of struggle between the centralised nation-state and regional oligarchies, in this case evident in the implementation of deforestation control policies (see section 8.4). In fact, after centuries of lawlessness in the Amazon, the prospect of an effective control by the federal state remains doubtful especially in states with thriving commodity export-driven economies such as Mato Grosso (Hecht, 2011).

In this regard, the environmental licensing scheme adopted by Mato Grosso can be seen as simply a legitimation of prior deforestation, as suggested by Azevedo (2009) in her in-depth empirical analysis of SLAPR implementation from 2000 to 2008. By analysing deforestation data from that period (and identifying no major difference between deforestation in holdings inside and outside the SLAPR system) and with a series of interviews, this author contends that there was an "economic project" behind the implementation of that system that would eventually legitimise existing agricultural production in the state. It would do so with the use of an "effective" environmental policy, whereby the used technology symbolised at the same time "state control" and "transparency" amidst a "globalised world" that demanded guarantees about the legality of products from the state (Azevedo, 2009: viii). She identified common conflicts concerning environmental liabilities to be compensated as well as the amount of LR in holdings. And it was precisely to solve these that the state government created the MT Legal law in 2008, dividing the SLAPR in two and postponing the legalisation of LR liabilities. The MT Legal was therefore a public policy intended to attract rural producers to adhere to the system, by granting them flexibility in regularising those liabilities (more time and less penalties).

Azevedo (2009: viii) argues that the idea was to "regularise" all rural properties as they currently existed, with environmental policy thus transformed into a policy to suit the "hegemonic interest

[236] Ibama would mainly focus on federal lands but given the extension of the territory and the lack of capacity of state SEMAs to control deforestation in each state, Ibama would also act on private holdings.

groups", using 'sustainable development' rhetoric. Rajão et al. (2012) also found that farmers joining the SLAPR had done so as part of a wider strategy whose objective was not to achive compliance with environmental regulations, but to continue or even extend the production areas. Indeed, the primary logic of land-use had not been changed after the implementation of SLAPR (see too Wertz-Kanounnikoff, 2005). This is, in fact, a crucial element in the 'greening' of Mato Grosso agribusiness as the environmental licensing process is eased into place, thus reducing illegality in the sector. In this regard, it is worth recalling that the Mato Grosso deforestation control programme intends to reach a level of zero illegal deforestation by 2020, while being silent regarding legal deforestation in private holdings.

Overall, the institutional apparatus in Mato Grosso seems ill-placed to act effectively as divergent interests lead to inconsistencies, contradictions and failures. This situation gets even more complicated given the State's general lack of resources for environmental protection. In fact, even if a grand technological apparatus had been created, the actual resources for monitoring and enforcement on the ground were sparse. In the environmental offices of Mato Grosso – the state SEMA and the federal Ibama - there was indeed a general feeling of a lack of means: both the SEMA official in Tangará da Serra and the Ibama official in Sinop acknowledged that. In Sinop, Ibama had to struggle with difficult working conditions due to the lack of resources, the huge area to control, and constant threats from agribusiness (Ibama Sinop official, 2012; see more below). An MMA official 2 (2013) also acknowledged: "If you ask if we have a sufficient number of personnel to survey the Amazon, I say no, we will never have, that's the point, there will never be enough". However, that official added, to overcome that deficiency, "we have been working a lot on strategic actions", the lack of resources in the field would become less relevant, as he put it:

> [With the evolution of the PPCDAm] Now we do not stay only 10 days or 1 month in the field, we stay there in the strategic places permanently... so it is a strategy in which you can go exactly where deforestation is occurring, so I don't have the sufficient number of officers in the field, but acting strategically, the Ibama with the Federal police, the army... all coordinated in deforestation control... you have a lot more presence in the field, and that makes a huge difference... as you evolve, you start doing intelligence work, investigating, with ever more frequent information on deforestation... you know exactly where the guy is deforesting on that day at that particular moment… We have seven

> helicopters for surveillance... we use them to have an element of surprise and arrive faster at the places (MMA official 2, 2013)[237].

Deforestation control in Brazil and in Mato Grosso in particular was hence increasingly more sophisticated with better information, but entangled in a web of contradictory agencies. This certainly contributed to the problems facing farmers in case studies 1 and 2 - the process by which farmers achieve compliance is not clear or practical; it is costly; and the existing positive incentives for compliance are limited (Stickler et al., 2013). However, Chapter 7 already indicated that deforestation control seemed to be contributing to holding back biofuel expansion. As such, and to gauge how far and in what ways the deforestation control apparatus affects activity on the ground, the chapter now examines farmers' perceptions of deforestation control policies across the two case studies.

8.2 Case study 1: blacklisting and the role of the *prefeitura*

As I travelled in Nova Ubiratã along the MT242 road in July 2012, vegetation became more frequent towards the east, whereas in the west, closer to the agricultural stronghold of Sorriso, cultivation prevailed with only remnants of natural vegetation spotted along rivers or on the horizon, far from the road. Nova Ubiratã nonetheless still had a significant percentage of natural vegetation (i.e. roughly 50% of that municipality), compared to its neighbours along the BR163. Being part of the deforestation blacklist (see Chapter 4), however, deforestation there was still high and environmental regularisation aimed at removing the municipality from the blacklist, a priority.

As seen in Chapter 7, Coopertã farmers were participating in the social biodiesel programme of the PNPB which does not require an environmental license. In fact, none of the interviewed farmers in Case Study 1 was environmentally licensed. Furthermore, as seen in Chapter 7, the role of the biodiesel industry in the region, besides fostering soybean production and hence increasing dLUC and iLUC pressure, through their *pacotes* also helped finance farmers who lacked an environmental license and who hence had limited access to conventional credit lines.

The main reason identified by the farmers that I interviewed for the lack of environmental licenses was the problem of land titles, a fundamental element in the LAU procedure. While five farmers held the title to their lands, others did not as they were stuck with issues related to the coloniser company who

[237] The MMA official observed that from the moment information is generated at the INPE, then processed in the Ibama, there is a gap of two to three days from when the deforestation started, such that officials manage to go to the place and prevent further deforestation.

had sold them the land in the 1980s; meanwhile two agrarian reform settlers were waiting for the INCRA papers. The land tenure uncertainty is certainly not exclusive to this region or to biodiesel crop producers, but rather a common hurdle indeed in the Brazilian Amazon following the occupation strategies of the 1970s and 1980s and associated violent land grabbing (see Chapter 4). Still today these uncertainties remain acute and bedevil deforestation control (hence the importance of axis 1 of the PPCDAm, see Chapter 4). Hence, as noted, attracting farmers through the Mato Grosso CAR mechanism would bring farmers gradually into legality, making them 'part of the system' and therefore enabling better monitoring and control of deforestation.

Yet, none of the interviewed farmers had completed the CAR process and those managing to gather together all the necessary documents were still waiting for the process to be finalised (Farmers 8, 9 and 10, 2012). The President of the NURWU (2012) added that many farmers, especially in agrarian reform settlements, were afraid of committing to the CAR as they would likely have to recover forest which would be a costly proposition.

Indeed, the entire process - starting with the CAR and leading to the final LAU - was routinely depicted by farmers as very bureaucratic, time-consuming, difficult and expensive, especially for the smaller farmers. Paperwork and the money and time needed to have it done were major obstacles. Yet the process was seen to be real enough in its implications: "environmental and bureaucratic restrictions" end up restricting the production of soybeans (Farmer 2, 2012), therefore signalling one area where deforestation control, through 'excessive' bureaucracy, affects biofuel production.

The farmers saw themselves trapped in a complicated, sometimes incomprehensible bureaucratic process where different governmental agencies "push away" their responsibilities and "played" with the owner ("he does not understand what is going on") (Farmer 1, 2012). Farmer 4 called for the government to solve the documentation problem: "the problem is not the law, nor the environmental demands, but the blocking caused by documents. The government needs to be faster with that bureaucracy". Farmer 3 (2012) bitterly added that "all the paperwork and money you need to spend and the time they make you wait… it's just to get money from us".

The complex and ever evolving Mato Grosso licensing scheme was hence, and not surprisingly, a puzzling issue for farmers, especially as it overlapped or created conflicts with other institutions, such as the Federal Ibama (see section 8.1). As Farmer 7 (2012) complained, sometimes "the Ibama

pushes it to SEMA, who pushes it to INCRA, you cannot solve it, even spending a lot of money... environmental law is too complicated and sometimes we get stuck without knowing what to do". Farmer 8 (2012) concurred, adding "SEMA and Ibama fight all the time... SEMA waves a license and then Ibama comes and says we cannot deforest". Farmer 9 (2012) in turn stressed that different institutions had different ways of imposing punitive measures, leading to unfair situations where only some were punished. He referred to a case in which SEMA had "closed its eyes" to deforestation in the neighbouring holding.

The time-consuming bureaucratic process, and inter-institutional contradictions and lack of coordination, are all key factors in explaining how difficult it is for farmers to get the necessary papers for environmental licencing. But even if not legally environmentally licensed due to the lack of papers, were these farmers respecting the Forest Code? Most farmers confirmed to having maintained the appropriate percentage of LR and APPs, such that they would only be illegal because they had land title problems and hence could not proceed with environmental licensing. The situation however was even more complicated than that. Thus, when I was in the field, the new Forest Code had yet to be approved such that farmers were confused about where they stood.

Set against such institutional complexity, there was inevitably a diversity of situations at the level of individual holdings. Farmer 2 (2012), for instance, recognised he had a "good chunk of LR and APP, all legal. The question is not having cleared beyond the limit but not having the necessary papers. I have little pieces of land that I could clear but it does not pay to do that". Some acknowledged they were below the necessary threshold while others stated that they were not sure about the percentage they had to leave because of the vegetation definition, i.e. whether forest or cerrado (Farmer 1, 2012).

The three farmers from the *Assentamento* Cedro Rosa were in a particularly complicated situation as, besides paper work, they had deforested more than the legal limit: "very little forest left, what is left was destroyed by fires. INCRA told us to leave 50% of forest standing, so now we are in that project with the municipality to recover the deforested areas [see below for more on this project]" (Farmer 6, 2012). Furthermore, when I was in Mato Grosso, agrarian reform settlements were increasingly being accused (by environmental authorities and agribusiness representatives) of being responsible for a great portion of Amazon deforestation, leading to the freezing of new projects in the region. And it is not surprising that *assentados* deforest most of their holdings surface; as the NURWU President

(2012) stressed, their land lots were already too small to have profitable soybean production without deforesting. The president of Coopertã, in the same tone, argued that these *assentados* could not survive by just clearing 20% of their plots, plus they were “left in the middle of the forest” most of the time without governmental support or infrastructure (Coopertã President, 2012). The PNPB was hence, as seen in Chapter 7, a great help and allowed these farmers, even without an environmental license for their lands, to be integrated in the soybean export monoculture chain with the support of biodiesel companies.

Implementation of agrarian reform settlements in the Amazon is just one example of the conflicting priorities of the Brazilian state and of inter-institutional conflicts between environmental agencies and the INCRA (as seen in Chapter 4, INCRA is the national institute of colonisation and agrarian reform, created during the military dictatorship). In this respect, the former mayor noted: “look at the contradiction, INCRA has put those people there, gave them land plots and told them to plant and take their living from it, then Ibama goes there and says no, you cannot plant nor make your living, otherwise you are fined” (Nova Ubiratã former mayor, 2012).

Not only has INCRA in the past stimulated deforestation so as to guarantee ownership of land lots in the Amazon, but also is now a major hurdle in environmental licensing as it is responsible for land regularisation (agrarian reform settlements but also other traditional farmers who acquired lands in the 1970s and 1980s) which, in turn, is fundamental for farmers to get their environmental licenses from the SEMA. In practice, land titles can take a lot of time to be sorted out, especially due to INCRA’s lack of resources, let alone the sometimes complicated land ownership structure (e.g. lack of papers of the coloniser companies who sold the land to settlers in the 1980s).

All these difficulties in licensing together with increased enforcement by Ibama has deterred many farmers from deforesting to increase production, as well as fostered price speculation of cleared land *vis-à-vis* forested lands, with iLUC consequences, as seen in Chapter 7 (Nova Ubiratã Environment Secretary, 2012; Coopertã President, 2012). All farmers acknowledged feeling more controlled recently by the authorities; the apparatus was more visible, the authorities stricter and the fines more abundant. As farmer 1 (2012) lamented, since 2000 there has been more control by the “Ibama mafia” and “environmentalists control everything by satellite”. The more conspicuous enforcement of deforestation control also encompassed symbolic measures of dissuasion by State control, such as

the decoration of the new Embrapa Sinop with an apprehended '*correntão*' (a thick chain used for mass deforestation) and wood derived from confiscated illegal log (see Figure 8.2).

The general mood regarding environmental licensing was that of injustice: "it is only fines and more fines... we are not criminals. There needs to be subsistence, otherwise everyone is going to live in cities" (Farmer 5, 2012). "Our problem in Mato Grosso is that of environmental laws... the Forest Code does not give the conditions for the people to work" (NURWU President, 2012).

However, the possibility of getting caught illegally deforesting by the authorities did not necessarily constitute an effective inhibitor of deforestation, most farmers also conceded. In fact, high returns on soybeans can outweigh the financial costs of clearing forest *and* offset the risk of incurring fines. Farmer 5 (2012), for instance, declared that many "take the easier path: they do it [clear the forest illegally] and then pay the fine if they are caught"; while Farmer 3 (2012) stated that "it is cheaper to pay the fine" than going on through all the licensing processes that could take years.

Figure 8.2 The symbolism of punitive measures. The apprehended '*correntão*' decorating Embrapa Sinop's external premises (picture on the left) and on the right the intricate decorations in the interior of the building, whose wood was supposedly derived from confiscated illegal log.

Source: the author (July, 2012).

As farmers noted, those who were better off (the 'bigger farmers') were prepared to clear the forest illegally and pay the fines or exploit their political connections to avoid having to account for their actions (Farmer 9, 2012). These bigger farmers were believed to be less fearful of Forest Code enforcement as "the big ones know how to respond, they pay the fine" (Farmer 10, 2012). Big landowners would clear their forests and then pay the fine, as it would be cheaper (Farmer 4, 2012; Farmer 6, 2012); or the "big ones they do what they want", as corruption would be high (paying of

bribes to SEMA officials) (Farmer 8, 2012). Especially after the Badalotti case[238], the feeling of injustice accrued: "all of us paid for what he did. He cleared with a *correntão* [see Figure 8.2] and destroyed everything, he is not even from here, he must be very powerful, there must be a senator involved in this case... when the people open little areas the law is applied strictly" (Farmer 5, 2012).

The effectiveness of deforestation control policies would hence be reduced:

> No, they keep on clearing. No, no no, there is nothing [inhibition]. They are all still clearing today… the smaller farmer is more afraid of being caught, the big one not… A poor agrarian reform settler cannot afford to pay a fine, the fines only favour the big ones because the big ones can use the judiciary in their favour and [still] deforest (Farmer 8, 2012).

The President of the NURWU (2012) declared too that farmers in general but especially the big land owners continued clearing the forest illegally, as the paper work could not be sorted out and "it is much easier to deal with the fine than to comply with the law". So illegal deforestation would continue as "the big ones are kept in power, they have the *Bancada Ruralista* defending them... they have money" (see more in section 8.4).

Seemingly, Stickler et al. (2013) have identified the limits of command-and-control and a general non-compliance with the Forest Code in Mato Grosso. These authors conclude that landholders were incentivised to the clear more forest than allowed under the Forest Code by the particularly high foregone rents from cattle ranching and soybean cultivation. They would thus take the risk of getting caught and if so pay the fines given the high potential rents. Furthermore, in Mato Grosso, only a small fraction of fines of identified violators seemed to be collected; often they stay pending under legal challenges for several years or are even cancelled (Bastos and Micol, 2011).

Despite these limits, there is a feeling among farmers of more surveillance and ('unfair') enforcement which is particularly significant given the context in which biodiesel feedstock farmers interact with deforestation control policy. In fact, the municipality of Nova Ubiratã was suffering the consequences of belonging to the blacklist of deforestation municipalities. The municipality was therefore in the spotlight and it is no surprise that deforestation control was a big priority for the municipal

[238] A mass deforestation event in 2011 in which 6,000 hectares were cleared in Nova Ubiratã, without environmental license, by Mr. Badalotti, a resident of Santa Catarina state. In: http://g1.globo.com/economia/agronegocios/noticia/2011/05/desmatamento-avanca-em-mato-grosso.html, accessed on 2 July 2015.

administration (the *prefeitura*). At the same time, the biodiesel industry seemed to be absent from the local deforestation control struggle, as it is not required to demand an environmental license from the family farmers participating in the social biodiesel programme, while at the same time helping them with their *pacotes*, thus by-passing Forest Code enforcement and related provisions, namely credit conditionalities.

The municipality, with the help of a foreign NGO – The Nature Conservancy (NC) – was implementing a regularisation programme aimed at removing it from the blacklist, once 80% of the rural holdings are registered with the CAR. The Consórcio official in Sorriso introduced me to a NC member and she gave me a ride from Sorriso to Nova Ubiratã as there was going to be a public hearing about land regularisation. She was herself a rural producer from Lucas do Rio Verde, where she had been environment secretary (that municipality had started the CAR model, later on adopted by the Mato Grosso government and more recently by the federal government, NC member, 2012; Nova Ubiratã former mayor, 2012; see too Hecht, 2011).

The NC, she told me, was helping with the implementation of the CAR in 12 municipalities in Mato Grosso. These projects depended in most cases on public financing through the *Fundo Amazônia* (see Chapter 4), whose funds were captured by the NC through the submission of projects that targeted funder priorities. In some municipalities such programmes were also privately financed, as in the Lucas do Rio Verde, notably by three private companies (including biodiesel producer Fiagril) (NC member, 2012). In the municipalities where it was working, the NC prepared a GIS database and managed it on top of satellite images, generating products such as highly location-specific land-use profiles, including remaining vegetation and was thus able to identity environmental “actives” (excess of LR to be used, e.g. for Payment for Ecosystem Services) and “passives” (liabilities such as lack of LR or APP) (NC member, 2012; Nova Ubiratã former mayor, 2012).

Not surprisingly, land title regularisation was the main bottleneck to environmental regularisation in Nova Ubiratã, so it became a priority given the objective of the municipality to leave the deforestation blacklist. Indeed, it was main reason for the public hearing held in that municipality that I attended (see Figure 8.3). When I interviewed the former mayor, he said that environmental regularisation was the top priority of the municipality: “we believe that without environmental regularisation you cannot provide development of the economy” (Nova Ubiratã former mayor, 2012).

The NC member told me afterwards that Nova Ubiratã had been evolving "fantastically" and that the mayor was a "great mayor", very concerned with the issue, willing to learn how to use GIS tools, and generally keen to make the issue a local priority. She added that in Mato Grosso it was important to have the mayor on their side (NC member, 2012). When I previously interviewed the mayor, he had showed me the environmental regularisation programme on the computer, was very aware of the technicalities of it, and in the end gave me a copy of the maps in a shape file, without the identification of the farmers[239].

Closely working with local authorities and farmers, NC was not confrontational: "For sustainable production you have to work with the rural producer and not against him" (NC member, 2012). During the hearing, I could perceive how close she was to the local administration and state officials, quite a contrast in fact to the more 'activist-rebel' kind of Greenpeace members I saw during Rio+20 (see Chapter 5) and interviewed in São Paulo; or the ISA and Formad members I interviewed in Mato Grosso, all of whom had a clear critical opinion regarding environmental protection in the state.

The NC-linked programme was called '*Nova Ubiratã Mais Verde*' ('a greener Nova Ubiratã'). It was run by the *Prefeitura*, in collaboration with the unions and with the financial support of the *Fundo Amazônia*. The project notably sought to help farmers in their CAR applications for free, which was indeed a great help as farmers then did not need to hire engineers or lawyers (Nova Ubiratã former mayor, 2012; Farmer 10, 2012). The database with georeferenced images identified holdings and was pre-adjusted to SEMA's SIMLAM system; however, the SEMA had no access to information about the owners. As the mayor stated,

> The farmer will have to analyse in which moment he is going to enter into legality, depending on bureaucracy, so I cannot send his data to the state SEMA... our main purpose is to provide consultancy to the producer and identify in his holding the deforestation, the passives and actives. It is to aid him in order for him to go towards legality (Nova Ubiratã mayor, 2012).

The public hearing was held at the school's sports pavilion (see Figure 8.3). As I could plainly see, it was a full house, with hundreds of people sitting and some standing. During the hearing the mayor announced an agreement to open an INCRA registration unit in Nova Ubiratã to solve land title issues

[239] As explained in Chapter 3, the mayor could not disclose information about the owner and legality of holdings and I could only rely on what individual farmers said about their holdings.

and a municipal law creating a municipal council for land title regularisation and sustainable development (CONRED). The mayor presented the current status of environmental regularisation in the municipality, with maps and satellite images skilfully deployed in a power point presentation. He pointed out that the municipality already had 70% of the areas registered, thus nearing the 80% target, stressing that “when there is a land regularisation problem there is an environmental regularisation problem”. During the hearing a map prepared by the municipal administration was distributed to attendees of the chronogram of registration activities, by municipal zones.

Figure 8.3 The hearing about land regularisation held at the school’s sports pavilion of Nova Ubiratã. To the right the mayor during his speech.

Source: the author (November, 2012).

It was also highlighted in the hearing that the main problem in Nova Ubiratã was the regularisation of *assentamentos*. Once the bigger holdings were registered in the CAR, it became harder to achieve the 80% target (so as to leave the blacklist), as there were many small holdings, especially in *assentamentos* whose situation was not yet solved. In these *assentamentos*, apart from the land title issue (mostly the responsibility of INCRA) they needed to recover vegetation as most LR had been cleared. So there were talks about the compensation for that lost vegetation in the Rio Ronuro Ecological Station, a state conservation unit to the east of the municipality.

Institutional and legal changes, plus the general level of complexity contributed to uncertainty, indeed leading to Kafkaesque processes between federal and state agencies. The mayor exemplified this with the case of a deforestation license submitted in 2000 to Ibama (as in those days forestry policy had not been decentralised):

> The license only came out in 2003 and the farmer cleared the forest in 2004. But then environmental management was re-allocated to the state SEMA (then FEMA), following de-centralisation, who then came and fined him…they told him that, with the new legislation, he would have to compensate his Legal Reserve. So he re-started the process, bought a new area in 2005 for compensation, registered that Legal Reserve and in 2010 the LAU came out. Then he finished clearing the land as he finally had all the paperwork done. However, when he did so Ibama returned and blocked it with a new complaint… they asked him why he had taken so much time to clear the holding… the area had re-generated, so for Ibama he now had to ask for another license. He had done it all correctly and still he had two fines…. The Badalotti case is the same thing, it would take him 10 years to get the permit… so farmers prefer to take the risk, and if fined to pay the fine (Nova Ubiratã former mayor, 2012).

The crucial role of the municipal administration was reflected in the way the mayor took the issue as priority and learned how to use the GIS system provided by NC (Nova Ubiratã former mayor, 2012; NC member, 2012; Coopertã President, 2012). It was also reflected in the strengthening of the municipal environment secretariat, the only part of the administration with its own headquarters, with a team expressly dedicated to the environmental regularisation issue (see Figure 8.4).

But this new emphasis on environmental regularisation was a matter of local contention. Thus, for example, some farmers from Coopertã, although potentially being able to benefit from the *Nova Ubiratã Mais Verde* programme to speed up their licenses, regretted that the municipal administration was too concerned with the 'environment'. They stated, for instance, that the mayor had abandoned its agriculture secretariat and put all the resources into the environment one (Farmers 1 and 8, 2012). They also criticised the environment secretary (see Figure 8.4) for being too close to the state and federal environmental authorities – e.g. communicating when there is a deforestation crime or warning of a forest fire - instead of protecting the farmers.

Such resentment held political consequences, ahead of looming municipal elections. True, the current PT mayor was not seeking another mandate but the PT was still part of a coalition running in 2012. Against that coalition, the candidate 'from the opposition' was the preference of most Coopertã farmers that I interviewed. They criticised the PT administration not only for being 'too close' with environmental enforcement authorities, but also for manipulating the votes from *assentados*, farmers whom they called lazy and dependant on governmental assistance (Farmer 1, 2012; Farmer 8, 2012). There were hence lively debates in the Cooperative headquarters among farmers. There was in fact a

political effervescence in the municipality, including political caravans and loudspeaker propaganda; candidates campaigning in the central square; and accusations about the stalking of opposition supporters.

Figure 8.4 The environment secretariat in Nova Ubiratã. "Rural producer: don't lose more time! [submit your CAR]"

Source: the author (November, 2012).

In the end, the 'opposition' candidate was elected (coalition PMDB-PSDB-DEM-PDT), notably supported by most Coopertã farmers. One of his promises was the re-instalment of the agriculture secretariat to assist farmers especially in those sectors requiring more technical support such as vegetable and fruit or dairy production. Still, he acknowledged that it was important to remove the municipality from the blacklist and committed to being a pro-active mayor, "going to Cuiabá (i.e., the state capital) to pressure for things when needed" (Nova Ubiratã mayor, 2012). The NC member, who very successfully had taught the former mayor to use GIS instruments and praised him for his crucial role in the municipality's road to regularisation, stated that she was expecting the new mayor to continue on the same path; "it could be a challenge", she conceded, but said she knew him very well and that things would hence work out well (NC member, 2012).

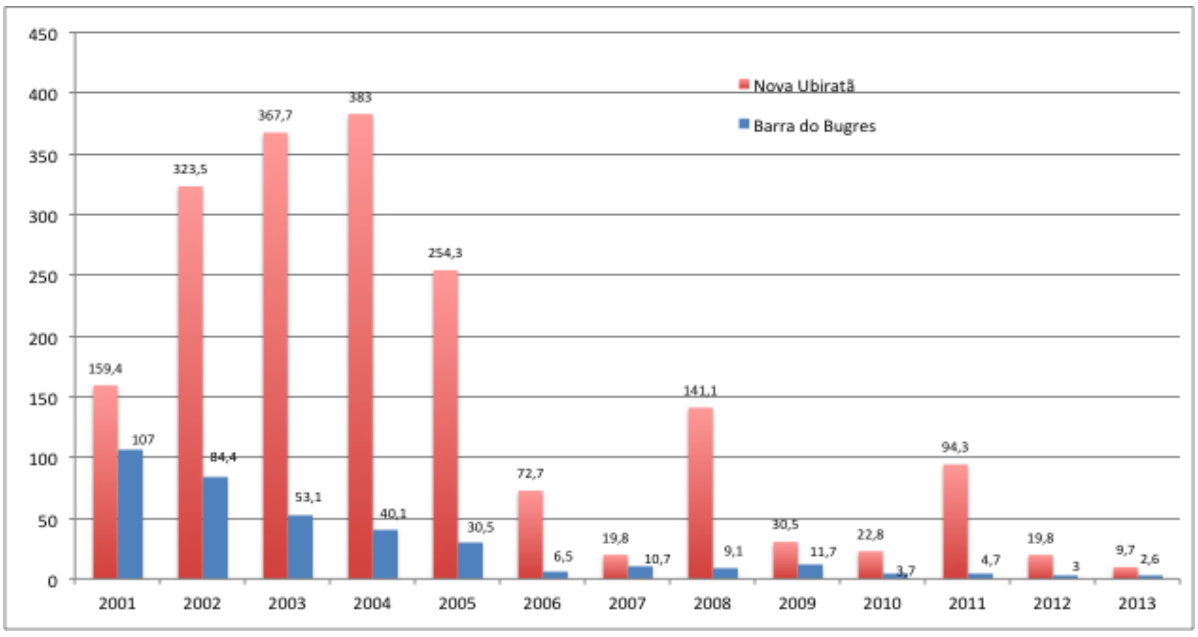
8.3 Case study 2: how 'green' is (Agro-)Industry?

Case Study 2 had a different institutional and economic structure, hence a different interplay with deforestation control policies on the ground. As seen in Chapter 7, sugar cane ethanol implies an

agrarian structure based on larger holdings surrounding the distillery and deeply connected to it, and there are no 'social fuel' provisions of the kind of the PNPB.

Furthermore, Case Study 2 was located in a municipality where deforestation control was not a main issue. With lower deforestation rates and an older colonisation resulting in consolidated pastureland and sugar cane plantations, Barra do Bugres, although located in the Legal Amazon and in the Amazon biome, did not constitute a priority municipality for deforestation control, and was not blacklisted as in Case Study 1 (see Figure 8.5). As farmer 16 (2012) noted: "In our region there isn't anything left to deforest, what there is still standing are areas of LR. Because here the areas were cleared 40 or 50 years ago". However, even with 'residual' dLUC, the case study provides empirical evidence of the difficulties biofuel crop farmers face to be environmentally licensed, and provides further illustrations of the political struggles surrounding Forest Code compliance.

Figure 8.5 Deforestation rates measured by the PRODES system from 2001 to 2013, in km^2, in Case Study 1 (Nova Ubiratã) and Case Study 2 (Barra do Bugres) municipalities.



Source: PRODES, in INPE's website: http://www.dpi.inpe.br/prodesdigital/prodesmunicipal.php, accessed 9 July 2015.

That this area was a low priority one for deforestation control was reflected in official attitudes. Hence, when I asked the municipal administration about the subject, it was unaware of the process of environmental licensing of rural holdings and hence indicated that it was not a priority. When interviewing the mayor, furthermore, I asked for GIS data of the kind the Nova Ubiratã mayor had provided me. But he had nothing on rural holdings, not even a map of the municipality with basic

information such as roads or hydrology. He told me to “ask about maps” in the technical department. Yet, when I went there, nothing was available: they did not have any kind of map or know about it[240].

I was able to get more information at the SEMA office in the neighbouring city of Tangará da Serra. The official there reiterated that deforestation was now a limited phenomenon but that in the past there had been little respect for the LR and APP. Yet because the region was more consolidated (i.e. already ‘cleared’) today, he said, there were fewer problems regarding LAU or deforestation surveillance. Farmer 17 (2012) bluntly said: “What’s the point of all that? They’ve increased enforcement too late, everyone has already cleared what they had to clear. So now what do they want?”

Furthermore, the SEMA official added, distilleries now had in their corporate structure environmental management sectors that were tasked to help recover degraded areas (SEMA Tangará da Serra official, 2012). Indeed, it was the industry working together with the farmers that was pursuing the environmental licensing matter. The institutional framework surrounding environmental licensing in Case Study 2 was therefore quite different from that of Case Study 1, where both municipal administration and the NGO were working together with the farmers in order to attain environmental regularisation. In Barralcool’s case, there was neither a NGO nor a municipal administration involved, but instead another dynamic.

In fact, it was the distillery engineers who were most aware of the land-use geographic information and environmental licensing process (SEMA Tangará da Serra official, 2012; Barralcool engineer 1, 2012; Barralcool President, 2012; Barra do Bugres mayor, 2012). Hence the industry was leading the way and bringing farmers together in order to achieve environmental licensing. As seen in Chapter 7, it was not possible to separate industry from farmers in Case Study 2 – a true agro-industry - as it was a group of farming families that created Barralcool and the company remains today a sort of ‘cooperative’ of farmers having shares in it. Furthermore, in ethanol production, plantations occur around the distillery, compared to the fragmented biodiesel production setup, so it is easy to identify farmers supplying sugar cane. In this sense, the environmental licensing of distilleries increasingly

[240] Later on, I was told by the SEMA official in Tangará da Serra that Barra do Bugres municipal administration indeed had a forest engineer who would have all the information I needed and that he wasn’t working there at the moment as he had been “borrowed” by the SEMA office in Tangará da Serra.

includes suppliers' compliance with the Forest Code (Irigaray, 2010). So it is not surprising that industry is more present here in biofuel-specific environmental programmes.

Barralcool's 'concern' with the environmental licensing of its members' holdings was consolidated with an agreement with the state SEMA – a true biofuel-specific deforestation control provision contrasting with Case Study 1's absence of biodiesel industry in the local implementation of deforestation control. A Protocol was signed on 17 April 2007 between the sugar-ethanol union of Mato Grosso (Sindalccol), and its associates (including Barralcool), and the SEMA in order to make the sector more environmentally responsible given that the Mato Grosso state had a bad reputation for deforestation. It sought to guarantee the environmental regularisation of rural properties producing sugar cane in order to comply with the Forest Code, to promote environmental improvements and to accommodate international consumer markets concerns. It also stressed that "tackling environmental problems associated with the productive sector depends upon a process of mutual understanding instead of ideological confrontation" (Sindalcool, 2007: 1). In short, it asserted that the sugar-ethanol sector should not be ostracised, but instead be recognised as a full partner in this process.

The Protocol set out a clear set of rules. Thus by the end of the 2007 harvest, it specified that: all APPs should not be occupied with sugar cane or any other cultivation; farmers should preserve and recover the APPs being used for sugar cane or for other production; they should establish a time-scale for the regularisation of the LR and APPs; and that they must guarantee that henceforth expansion be done only in already cleared areas. The SEMA in turn should assist rural producers in achieving environmental regularisation, thereby diminishing transactional costs. Sindalcool, meanwhile, committed to promoting the awareness of the sector, and to coordinate the technical implementation of the Protocol (Sindalcool, 2007).

The Protocol, however, seemed to be a sort of imposition on local actors – directly from environmental authorities and indirectly from international consumer markets – with industry complaining about the unfair treatment of the sugar-ethanol sector in Mato Grosso compared with other sectors. The president of Barralcool, for instance, complained that it was not a decision by the factory (i.e. by the business community) but "a requirement of the Mato Grosso government, the SEMA, so we are the main focus… in any other place in the country you can produce sugar cane without CAR or LAU" (Barralcool President, 2012). The Sindalcool representative similarly complained

that the sugar ethanol sector in Mato Grosso was unfairly punished compared to other regions due to Mato Grosso's poor environmental image, which in any event was largely due to soybean and not sugar cane production (Sindalcool representative, 2012).

Still, and notwithstanding such grumbling, the Protocol fostered a series of measures since 2007 aiming at the greening of Barralcool, which were highlighted and praised even by Barralcool's administration (Barralcool President, 2012). Hence, one of the main achievements of the agreement was the plant nursery created by Barralcool in 2007 to plant 150,000 trees per year.

The nursery was intended to help the farmers recover their APPs, the most pressing objective of the Protocol. According to Barralcool's forest engineer, most of Barralcool farmers today have their APPs preserved (Barralcool engineer 1, 2012). In fact, only one of the farmers that I interviewed admitted to not respecting the APPs as they were cleared a long time ago and still needed to be recovered: "before we would clear everything all the way to the river, we are now letting it grow back" (Farmer 16, 2012). Farmer 11 (2012), in turn, was actively delimiting APPs in his property (when I visited his holding he showed me the water sources and riparian vegetation being restored).

Indeed, it was even suggested that the APPs of Barralcool farmers now even exceeded the requirements of the Forest Code because of changing state legislation (Barralcool engineer 1, 2012). In fact, state law[241] from 1995 was more restrictive in terms of APP than the Forest Code then in place, so when a new state law was adopted in 2010[242] featuring the same measurement as that Code, the recovery of APPs was already well-advanced; indeed, the APP became bigger than necessary in the end, the forest engineer declared (2012).

Regarding the Legal Reserve (for which the Protocol does not indicate a deadline), however, the situation of Barralcool farmers is more problematic, the Barralcool forest engineer (2012) told me. While most farmers claimed to have respected the rules here, three others declared having less LR than the legal limit (Farmers 13, 17 and 18, 2012). Farmer 18, for instance, argued that this discrepancy was due to Forest Code changes over the years and hence he had respected LR according to the past provisions. To solve the issue of lack of LR, farmers would need to buy land somewhere else to compensate (Barralcool engineer 1, 2012). However, doubts existed regarding

[241] LC 038 of 21 November 1995.
[242] LC 412 of 13 December 2010.

how to implement the compensation as a new Forest Code was being discussed which would lead to new federal legislation regulating compensation (as of August 2015 still to be adopted), while the current legislation on that issue was Mato Grosso state's:

> Now the LR we will have to work to see where we can compensate it. There is no clarity about where we can compensate, which areas are available…. It is a problem of the organisation of the SEMA, of the State. It will have to be in another municipality as in Barra do Bugres there are no conservation units (Barralcool engineer 1, 2012).

The Protocol thus seemed to have fostered the recovery of APPs, while the LR results remained somewhat mitigated and awaiting new Federal guidelines. But besides the push by that industry-SEMA agreement, it is worth recalling that other factors may help explain why Case Study 2 farmers were in a more advanced state in the environmental licensing of their holdings than Case Study 1's. In fact, sugar cane farmers in Case Study 2 were not only more capitalised but also seemed to be better informed about environmental legislation (e.g. Farmer 11 when showing me his holding was aware of the different laws and the evolution of the Forest Code). Furthermore, the older occupation of the region indicated a lesser prominence of land ownership issues (all farmers had the titles of their lands) or dLUC in current days, so fewer issues blocking environmental licensing.

It is not therefore unexpected that all farmers except two in Case Study 2 had started the CAR process (Farmers 12 and 15) and were waiting for the new directives of the federal CAR. As for the LAU, most farmers had it for at least part of their sugar cane fields - only two farmers were still waiting for their LAUs after having submitted all necessary documents (Farmers 11 and 16, 2012).

The degraded areas recovery programme in the framework of the Protocol also seemed to be well accepted by farmers, even if recognising that they were obeying the rules because the industry told them to do so. Indeed, as one individual put it: "So we must comply [with environmental legislation] otherwise we would compromise the distillery and we don't want that, as it is the source of our subsistence" (Farmer 16, 2012). Furthermore, clients would be more demanding in terms of environmental issues: "Coca-Cola is a big client of ours, so all its production in Mato Grosso, practically all sugar is ours. So Coca-cola's demands are very complete, so everyone needs to respect APPs… so everything must be done" (Farmer 14, 2012). So "the folks are aware of that, everyone is more than oriented and has adopted it in their conscience. There might be deviations but

those are exceptional cases… if there is any deviation the problem is with the producer, not the distillery, the distillery has nothing to do with that" (Barralcool engineer 1, 2012).

In any event, stricter enforcement of deforestation control by the federal Ibama would make clearing new areas almost impossible (see Chapter 7), even as the SEMA-industry agreement separately made deforestation even more difficult. Now all farmers seemed to be focused on the recovery of APPs and LR and none was thinking about further deforestation. In fact, there would be no chance of getting away with clearing illegally (Farmer 12, 2012). Asked about if they wanted to deforest anyway, farmer 17 answered: "no, no, my father does not think like that anymore. He likes to make everything correct, to prevent problems".

Still, the licensing process was not free of problems, as some of the issues identified in Case Study 1 also cropped up in Case Study 2. The uncertainties of the new Forest Code, for instance, were identified as the main problems of the licensing process. As farmer 11 said, "many people stopped the LAU process because of the new Forest Code discussion, and with the final outcome it ended up benefiting a lot of landowners, so in doing that, if they had adhered to the LAU with the CAR, today they would be in a tough situation" (Farmer 12, 2012). The environmental law uncertainties were a major problem as they involved "changes here, changes there, changes again, and so far no conclusion, right? There is a lack of definition that would enable us to move forward, to know what to do, as today we are kind of lost in this environmental issue" (Farmer 15, 2012).

Another issue mentioned by farmers from both case studies 1 and 2 was excessive bureaucracy and associated corruption, as well as the lack of coordination among agencies that ended up blocking the licensing process:

> Sometimes it isn't our fault; it is the governmental administration's fault. They haven't enough people to manage the licenses, there are not enough technicians to visit the holdings and check if it is cerrado or not. So they should facilitate the process… bureaucracy in the licensing process by the SEMA, but also by the INCRA in the process of georeferencing, it is quite complicated. And you end up being blocked because of that (Farmer 14, 2012).

Of course, I wanted to assess the claims of farmers and Barralcool representatives against actual land-use data of a kind that was readily available in Case Study 1 (but with no identification of holdings' owners). Unfortunately, as noted above, the municipal administration of Barra do Bugres could not provide any GIS-based information. At the Barralcool unit, in turn, the forest engineer (Barralcool engineer 1, 2012), when asked about maps of the implantation of the sugar cane fields, told me that I should contact the agrarian engineer. I went to his office, passing through a room with several people working on computers and a huge map of the plantations on the wall, depicting each individual land holding. In his office, I presented myself and my research and told him I had already talked to the President of Barralcool and to the other engineer who had advised me to talk to him. I asked if he had maps of the implantation area of the unit and its plantations, preferably in a *shape file*. He then exploded and asked: "What are your real intentions? What will you do with that information in Europe? I am not revealing our secrets to you!" He then expelled me from the premises (Barralcool engineer 2, 2012).

Figure 8.6 From a Barralcool leaflet distributed to visitors: the socio-environmental responsibility of Barralcool and a description of its degraded land recovery programme with a picture of the tree nursery, on the left. On the right, a list of the environmental and quality programmes Barralcool was engaged with.

Source: Barralcool leaflet (2012).

I was perplexed with such an aggressive reaction, arguably the tensest moment of my research in Brazil. I felt a suspicious atmosphere surrounding me in the factory and in the following hours and

days in the city. This 'tense atmosphere' may well have just been a result of my subjective perception of what had happened, but I ended up conducting no more research there and returned to Cuiabá. Later on, however, I found data with the location of the sugar cane plantations in Barra do Bugres (even if not possible to identify holdings' owners), in a municipality-specific spatial analysis by the CanaSat project[243].

I was also told by my contacts in Barra do Bugres (see Chapter 3) that both Barralcool and the newly elected mayor were upset and afraid of disclosing information to an NGO that had been investigating environmental impacts (especially pesticides) of the sugar cane industry in the region. The newly elected mayor, after several attempts at reaching him through my contacts who were his friends, ended up rejecting an interview because he was afraid of environment-related questions as he was the representative of an agro-chemical company in the region, selling to sugar cane farmers and that an NGO had been investigating that company recently.

So I must have been mistaken as an 'environmentalist' by both Barralcool's agrarian engineer and the Barra do Bugres new mayor, even though I have always tried to remain neutral when approaching interviewees (see Chapter 3 for more on how I presented myself to interviewees). The NGO investigating in Barra do Bugres was most probably Formad. In an interview with one of its representatives in Cuiabá, I was told they were doing a study on the Barracool industry impacts. This study comprised public hearings and talks with representatives of farmers and local authorities and Barralcool had been unwilling to talk to them or cooperate in any form (Formad member 3, 2012).

This reactive stance at first seemed odd given Barralcool's generally favourable public image underpinned by a sophisticated environmental management system, its degraded areas recovery programme, a mostly mechanised harvest (that automatically has reduced adverse environmental impacts from the use of fire), the diverse certification schemes adopted (such as ISO 9001) and various social projects in the local community (see Figure 8.6). Yet, as my research progressed, I came to see how the 'environment' remained a source of tension for the firm, even with its environment-friendly image. In fact the Protocol signed with SEMA for the environmental regularisation of sugar cane plantations although adopted, constituted a contested matter for both Barralcool and Sindalcool. In the end, the aggressive attitude of Barralcool's engineer indicated to me

[243] Spatial analysis available at the website: http://www.dsr.inpe.br/laf/canasat/en/.

that behind their rhetorical construction of a 'win-win' marriage between development and environment, there was another side, suspicious and critical of environmentalism, which I explore in the next section.

8.4 Greening settlers' minds? The ambivalent environmentalism of biofuel crop farmers

Deforestation control in both case studies was intertwined with broader struggles on the 'environment', broadly depicted in Chapter 5. Notwithstanding the adoption of ecological modernisation and sustainable development discourses, the agricultural sector – from agribusiness lobby representatives to individual farmers producing biofuel crops – in the end revealed bitterness concerning environmentalism in general and deforestation control in particular. Being located on a globalised agro-industrial landscape, the deforestation control *panopticon* implemented in Mato Grosso and its coercive threats seems to fall short of transforming environmental subjects (Agrawal, 2005). Given the contestation of farmers and industry regarding deforestation control depicted in the previous section, it is necessary to contextualise their 'ambivalent environmentalism'.

It was not only Barralcool in Case Study 2 that presented a series of instruments of environmental regularisation. In the BR163 soybean producing region close to Case Study 1, around the dynamic agro-industrial cities of Nova Mutum, Lucas do Rio Verde and Sorriso, the times too seemed to be of environmental awareness. To be sure, most of what could have been cleared had already been cleared - the remaining vegetation consisted of APPs along water courses, with the landscape being dominated by vast soybean monoculture. But the thriving cities – great soybean exporters - had been investing in environmental programmes. Sustainable development was now part of the 'official' discourses and also used in the greening of industry, such as soybean processing and biodiesel units (e.g. Fiagril in Lucas do Rio Verde). Politically, the sustainable development discourse was seen as a way of legitimising local production amidst international attention towards the Amazon.

In the 2012 municipal elections, 'sustainable development' was one of the standard components of political programmes, such as that put forward by the PSD party (see Figure 8.7). This party ended up winning the biggest number of municipalities in Mato Grosso and especially along the BR163 soybean-producing region[244]. Ahead of the elections, many agribusiness-related politicians were present at the PSD party regional convention in Sorriso (11 May 2012), including federal congressman Homero Pereira and Mato Grosso state parliament president José Riva (see Figure 8.8). I attended that convention and then visited the agricultural fair in that town (the *Exporriso*) with a group of state parliamentarians. The new anti-corruption law in municipal elections (and how to 'navigate' in it towards effective candidacies) and the state's infrastructure bottlenecks were the main topics, while the tone was that of highlighting the heroic struggle of the colonisers who had built a modern and rich state, and were now being unfairly hounded by environmentalists, aided and abetted by international NGOs.

Figure 8.7 The PSD party motto for the inclusion of sustainability on the 2012 municipal elections programme. "Sustainability is a great idea. PSD supports and defends environmental preservation as a human survival factor and of life itself on the planet. It is possible to expand the production frontiers in a sustainable and responsible way".

Source: PSD municipal elections booklet (2012).

[244] Not to be confused with the *Partido Social Democrático* that existed from 1945 until 1965, the PSD was created in 2011 notably with dissidents from the Democratic Party (DEM), including former mayor of São Paulo, Gilberto Kassab and Senator Kátia Abreu (now in the PMDB party and Minister of Agriculture since January 2015). In the first municipal elections after its creation (2012), the party ranked fourth in Brazil in terms of municipalities won.

Figure 8.8 Congressman Homero Pereira speaking at the Mato Grosso PSD party convention, ahead of the 2012 municipal elections.

Source: the author (May, 2012).

In this way, the 'sustainable development' discourse so visibly used in the PSD campaign was seemingly no more than rhetoric, a point forcefully made to me by NGO activists. As a Formad member said, the agribusiness sector in Mato Grosso, which is export oriented, had to adapt and hence adopted a 'sustainable development' discourse and a plethora of environmental programmes. But, she told me, it would be too naïve to believe there was a real change in environmental awareness of these farmers and industrials: "they propagate [the discourse], the media are in favour of these guys… they are very well organised… and have representatives in every [political] place" (Formad member 2, 2012).

Recall that a long history of high deforestation rates had given Mato Grosso a national and indeed international negative image. Hence, a great effort was being made by state authorities, state politicians and agricultural and industry representatives in trying to change that image. In practice, though, there seemed to be deep-rooted feeling that the politics of 'environment' was nothing but an obstacle to development (see Chapter 5). Farmer 1 (2012), for instance, on the new Forest Code discussions said:

> It has to be solved quickly because the owner is not a felon. Have the environmentalists thought where food comes from?... [by vetoing some of the provisions of the new Forest Code] Dilma wanted to please environmentalists and foreigners but it is the agricultural sector that is pushing the economy.

This extract sums up most of the discourses against environmentalism enacted by agribusiness: the victimisation of farmers, as they are unfairly punished by deforestation control enforcement; the grudge against environmentalists (and urban lifestyles in general) who do not understand how and

where food comes from; the grudge against NGOs and foreigners criticising Brazil for deforestation; and the great role of agriculture in Brazilian economic growth.

There would be "environmental fear" among farmers, a state parliamentarian highlighted: "today our greatest fear is the environmental one, it is not budget, not soybean prices, not the dollar, it is environmental" (ALMT parliamentarian 4, 2012). Hence the calls for a less punitive stance again by another state parliamentarian: "Mato Grosso, mainly in these environmental sectors, it has to be more 'guiding'… it is now punitive, it only punishes" (ALMT parliamentarian 3, 2012). Command-and-control punitive approaches should be replaced, in the opinion of agribusiness and Mato Grosso state officials, by a more business-oriented stance aiming at promoting 'sustainable' activities so that farmers could be enticed to let the trees stand (CNA representative, 2012; Famato representative, 2012; SEMA secretary, 2012).

The complaints about the punitive side of deforestation control are closely connected with the general grudge against environmentalism: "we are not felons! Ibama arrives here with heavy weaponry, strong pressure, we are treated like felons. It is humiliating" (Farmer 1, 2012). And it may be easy to understand where such a grudge came from. As the Consórcio official in Sorriso (2012) told me, the way the federal government and federal police had been treating and punishing farmers made the sector feel angry. In fact, she argued, even if today's reality is different, in a not too distant past (i.e., 1970s and 1980s) these farmers had come to the region in the first place based on a scheme of government incentives designed to clear the land to make a living, most of the times in very difficult conditions (see Figure 8.9).

Figure 8.9 The harsh conditions in the early years after colonisation in Nova Ubiratã, late 1980s: clearing the land to make a living.

Source: personal photos of Farmer 8, used with permission.

Such accounts of the 'brave people' who occupied and modernised the state but who were now being ostracised by environmentalists were common at the highest political level. Senator Blairo Maggi, for instance, at the opening of the Embrapa in Sinop (see Chapter 6), stated that "this northern region, it has been crucified, tormented..." At the same event, Federal congressman Nilson Leitão further elaborated:

> A region that [has endured] so much during the last years... more than 10 environmental operations... we do not want to be treated as Legal Amazon, as they were naming our production, the fruit of our sweat and hard work... we want to be treated as Brazilians, as the region that has developed and grown thanks to our sweat, to the dream, and many have died and lost in the pursuit of that dream because of the lack of hospitals, but died thinking that this was the land, that here it would be different.

Mirroring the 'anti-international' stance depicted in Chapter 5, in the case studies there was also a tendency to complain that Brazil suffered international pressure and that NGOs were a part of it. The Ibama official in Sinop (2012) confirmed that a "myth" had been created about that and propagated by agribusiness discourses. And farmers adopted these discourses placing the issue of deforestation as an example of foreigners imposing environment preservation on Brazil, hampering its development: "NGOs should stay in their countries" (Farmer 1, 2012); or even "they are too concerned with Brazil, but let Brazil do it by itself" (Farmer 6, 2012). Farmer 9 (2012) in turn argued, "the greatest interest is not even to preserve... And those meetings they have, the G20, G8, 'G don't know what', no one has committed... So, certainly, the objective is not to preserve the forest but to hamper Brazil".

Closely related to the anti-environmentalist stance, and again mirroring the rhetoric identified at the national level in Chapter 5, farmers in both case studies have revealed an anti-urban stance: "people from the cities are against the countryside" (Farmer 1, 2012), and those from the cities were most responsible for climate change (Farmer 3, 2012), or big cities did not preserve river banks as farmers did (Farmer 5, 2012), or even that "the biggest ecologist is the agrarian producer", not the city people (Farmer 18, 2012).

The Nova Ubiratã mayor (2012) summed up the anti-NGO, anti-foreign and anti-urban mood of Mato Grosso farmers:

> Many times they are concerned with us, with our food production which is sustaining those who live in cities... they focus a lot on agriculture, why? Because media is always

> against agriculture, why? Because we are direct competitors. Today Brazil is only second to the US in grain production... So today the question is commercial and not ecological. The US and especially the NGOs from there when they come here look at us and talk about deforestation... they should go to São Paulo, for instance, where everything is deforested and rivers polluted, why don't they go there?

The rural-urban dichotomy was reflected too in the state's parliament, the *Assembleia Legislativa de Mato Grosso* (ALMT). I interviewed one of the few ALMT members from urban Cuiabá, while most other parliamentarians had more or less evident connections with the agribusiness sector and came from rural areas and/or cities which were centres of production in rural areas. He said that the difference was very clear in the ALMT and that he was isolated and with his more critical (i.e. pro-environmental) position blocked by the majority (ALMT parliamentarian 5, 2012). Indeed, some parliamentarians could be considered as constitutive parts of agribusiness (as they were themselves agriculture producers) and hence who subscribed to very clear anti-environmentalist discourses (SEPLAN official, 20012; Formad member 2, 2012; ISA member, 2013). Some even dismissed the relevance of deforestation levels in Mato Grosso: "in reality there is not high deforestation, it only exists in the media, not in reality, you know?" (ALMT parliamentarian 2, 2012).

Figure 8.10 On a road by Sinop: "Congratulations congressman Homero Pereira. Mato Grosso leading the rural front at the National Congress".

Source: the author (July, 2012).

In fact, politics and agribusiness seems to have a promiscuous relation in Mato Grosso to the point where it is not possible to separate the one from the other. Mato Grosso representatives in the Federal Congress too have been major agribusiness advocates, sharing opposition to environmentalist discourses. The late Homero Pereira (see Figure 8.10)[245], for instance, was a member of the lower house in Brasília and one of the leaders of the agribusiness (or rural) front there, especially during the discussions on the new Forest Code. He once stated:

> It is with a lot of pride and satisfaction that I register in the Annals of this House that my state of Mato Grosso is commemorating 263 years of history, culture, tradition and development. Congratulations to all the people of Mato Grosso that, confirming our agricultural vocation, give an example of overcoming because, even with our logistic and infrastructure constraints, we've achieved first place in gross agriculture production in Brazil... So I want to congratulate all rural producers of my state for the excellent economic, social and environmental indicators… to register the importance of agriculture for Mato Grosso and Brazil… stimulating revenue from the countryside will certainly translate into more jobs, more investment and a higher HDI and per capita income… our strength and vocation for consolidating as the most important state in the country for food production (Homero Pereira, 2011)[246].

This extract sums up most of the elements of the hegemonic agribusiness discourse in Mato Grosso. It highlights the strength of "all the people of Mato Grosso" who amidst adversity have colonised the difficult region and in a few decades brought it to the forefront of development in the country, thanks to their hard work in the expansion of agriculture. But who are these *matogrossenses* (i.e. the inhabitants of the state of Mato Grosso)? Does this include the diversity of traditional and indigenous peoples, the landless and the agrarian reform settlers, or just large landowners originally from the southern states and who have 'bravely' cleared the land, occupying thereby lands previously occupied by indigenous and other traditional peoples in order to build a 'modern' state? And whose culture and tradition is he referring to?

[245] Homero Pereira died from cancer at the age of 58 on 20 October 2013.
[246] Speech at the Lower House of the National Congress, 9 May 2011.

This brings to the fore the issue of identity. Chapter 7 has cast light on how class differences and struggles shaped land-use dynamics in the case studies and noted that identity and the 'settler culture' in particular were also relevant. Identity seems to shape environmentalism in Mato Grosso too, as a marker of the 'us against them' rhetoric. Thus any analysis of the political dynamic surrounding deforestation control in biofuel crop holdings needs to take into account that identity (and the 'settler culture') frame the anti-environmentalist discourses and enables a better understanding of how and why contestation to deforestation control occurs[247].

Figure 8.11 A farmer from Case Study 1's Coopertã. A *gaúcho* lifestyle: holding the typical *chimarrão.*

Source: the author (July, 2012).

As Martins (2002) stated, there are different kinds of farmers with different origins, ethnicities, cultures and social relations of production; hence it is not possible to think of a 'Mato Grosso peasantry' converging in a single project (also Lima and Pozzobon, 2005; Silva, 2007). In fact, in the case studies there was no uniform, essential 'farmer' category, given all the differences and conflicts within it – e.g. family farmers criticising *assentados* for being "lazy" or blaming them for deforestation (Farmers 1 and 8, 2012); or accusing the big landowners of getting away with environmental crimes due to their political connections (almost all farmers from Case Study 1) or blaming the soybean sector in general for the environmental restrictions in Mato Grosso (sugar cane producers from Case Study 2) Furthermore, notions of 'family farming', 'peasantry' and even 'agribusiness', while

[247] I reiterate my earlier point that identity was not the central concern of my thesis but was considered briefly here and consists in a topic for future research (see Chapter 9).

sometimes useful categories of analysis, nonetheless can oversimplify assumptions hindering insight, as the local realities show a less homogenous and more mutating social landscape.

What was clear from the fieldwork was that both case studies revealed a common stance against environmentalism, no matter whether *assentados*, family farmers or big landowners, let alone whether they were sugar cane or soybean producers. This shared antipathy regarding environmentalism reflected the fact that, in effect, they saw it as going against their dream of a 'promised land'. Indeed, perhaps identity and especially 'settler culture' provide the best explanation for the anti-environmental stance of farmers.

In Case Study 1, almost all interviewed farmers came to what nowadays is called Nova Ubiratã from southern states (e.g. Rio Grande do Sul or Santa Catarina) in the 1980s, with a '*sulista*' or *gaúcho* culture[248] that has its own values and visions notably about nature. There was a cultural and economic distinction between these new settlers from southern states, descendants of Europeans who arrived in Brazil in the late 19th and early 20th century (in Nova Ubiratã these are mainly descendants of Germans or Italians), and 'the others', the older-established inhabitants of Mato Grosso (ethnically mixed between indigenous, black and European), referred to as *caboclos* or *cuiabanos* (Passos, 2010; Desconsi, 2011). In the farmer's house where I stayed in Nova Ubiratã, for instance, the family would watch *gaúcho* television, would listen to *gaúcho* radio stations, would eat *gaúcho* style (*gaúcho* breakfasts and meat barbecues) and take their *chimarrão* (a container for yerba-mate infused drink) everywhere (see Figure 8.11).

By contrast, farmers in Case Study 2 were mostly from São Paulo (*paulistas*) where their families were already big landowners, producing coffee or cattle, before having come to Barra do Bugres. They were more 'cosmopolitan' than Case Study 1 farmers, in the sense that they were more open to international goods (cars, expensive clothes and watches), would frequently go to São Paulo and often travel to Miami, compared to the very frugal lifestyle of farmers in Case Study 1. This could indeed just be a result of being more capitalised, but I noted how farmers in Case Study 1 were much less willing to adopt foreign (i.e. non-*gaúcho*) culture.

[248] *Sulista* means southerner and is commonly applied to the settlers who came from southern Brazil (Rio Grande do Sul, Santa Catarina and Paraná states). They are seldom called *gaúcho*, which is the specific designation for the residents of Rio Grande do Sul. These are very proud of their particular *gaúcho* culture and gather in the numerous '*Gaúcho* Traditions Centres' – the CTAs (*Centro de Tradições Gaúchas*) - very common in Mato Grosso cities, to celebrate their culture.

How this *gaúcho* or *paulista* origin in case studies 1 and 2 represents a particular agrarian ethos, and hence influences local land-use and environmental conflicts, needs further research (see also Chapter 9). Nevertheless, in general, a narrative of a typical farmer was built who would transform the 'frontier' into modernity – these settlers were for the government and the coloniser companies the most adequate and prepared for undertaking modern production practices (Souza, 2008; Barrozo 2010). From this it follows that issues of culture and identity, especially of belonging to an embattled community – 'brave settlers' involved in a struggle of 'us against the others' - shape not only the way farmers perceive and use the land but also how they interact with environmental law and environmental NGOs.

Figure 8.12 'Alternative' *matogrossense* livelihoods. On the left the Umutina indigenous land in Case Study 2's Barra do Bugres. On the right, landless people camping on occupied land while waiting for INCRA to officially allocate them a land plot, in Case Study 1's Nova Ubiratã.

Source: the author (November, 2012; July, 2012).

This settler culture has also had a particular antipathy towards those who were resident in the area before them and who present different territorialities and livelihoods (see Figure 8.12). Notable here was the treatment given to 'others', namely previously established *cuiabanos* as well as indigenous peoples. As a Mato Grosso state parliamentarian opined, pioneers from southern states arrived with a "cultural degree above average", specifically good experience in modern, export-oriented agricultural techniques (ALMT parliamentarian 1, 2012). A senior Embrapa official (#1, 2012) in Brasília meanwhile declared that "one of the factors that enabled agricultural growth in the region was that Cerrado was a 'demographic void', so it was possible to replace, without major cost, the local population with much better trained farmers from the southern states". The pre-existing local population was clearly held in much contempt. Thus, a big landowner from Lucas do Rio Verde declared, "if it weren't for the people from the South, Mato Grosso would be all filled with those poor

houses *(casebre)* like those we see in Rosário Oeste [a city by BR163], the *cuiabanos* do not work the land, do not promote development" (Big landowner, 2012). The alleged superiority of southern settlers was also often linked to racial profiling. As one Mato Grosso parliamentarian confided:

> Mato Grosso developed in the last decades due to human racism, with racism not of being racist, but racism of being powerful, of hard work, of getting things done… The *gaúcho* race, a pure-blood race, right?… so migrants that came here were great 'trail-blazers' [*desbravadores*], with the courage to succeed… we've built the most beautiful cities of the state in the last three decades. With this powerful development, of hard work. But today we are coined as the villains of destruction. And the media should be more present to understand what production is and what destruction is (ALMT parliamentarian 2, 2012).

In contrast, local indigenous peoples were seen to be lazy, in possession of too much land that they did not know how to use to best effect, and whose ultimate dream was for the same lifestyle as other Brazilians yet they lacked the initiative to achieve it. The Sedraf secretary (2012) for instance, typically noted in this regard:

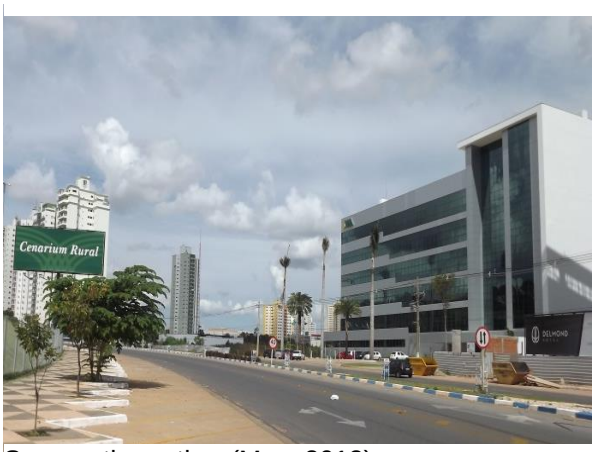
> In truth they do not want to work, they want to get money without working. Because if you let them live from what they have in their indigenous territories, they would starve to death. So my dream is one day to see Indians on a tractor planting, creating cattle, dairy farms. That is what we have done!

Clearly, the intention of colonisers was not only to pursue their economic dreams but also to assert political domination in the region to thereby 'lock in' their advantaged position (Souza, 2008; Barrozo 2010), notably by claiming territory from the 'other' peoples. A discursive strategy was key here and always featured 'progress' as the key word and the 'heroes of the frontier' rhetoric (see above the extracts by Mato Grosso politicians). It highlights the developers, colonisers, and pioneers who became part of the 'dominant class'. The successful pioneers started to dominate, creating a hegemony articulated around particular values, practices and ideologies, and divulging the myths of progress, civilisation, modern and developed agriculture (Souza, 2008). It is in this framework that we can understand the 'agribusiness hegemony' in Mato Grosso state politics, even if agribusiness is a fairly composite designation applied to the export-oriented agricultural sector in Brazil, but in Mato Grosso it has a clear connection with a 'successful settler' culture.

It is true; agribusiness hegemony is not new in Brazil. The difference today is that agriculture is 'modern', in that it is connected to industry (i.e. 'agro-industry'), more structured than in the past, and is a key export sector. Agribusiness leadership is much more sophisticated, with strong links to the PR and consultancy sector (e.g. CNA, ICONE and UNICA). And this tendency also happens in Mato Grosso, where local rural oligarch families are well connected to and coordinated by CNA through the Famato.

It couldn't be more symbolic of the hegemony of agribusiness in Mato Grosso that the location of the Amaggi group headquarters is in the Political Administrative Centre (the CPA) in Cuiabá (see Figure 8.13). The Amaggi group is a holding company dedicated to agribusiness in the planting sector, processing and trade of grains, production of seeds, reforestation, or cattle ranching. Blairo Maggi, who owns the Amaggi group, is known as the 'king of soybeans' as his company is the biggest producer of soybeans in the country[249]. Interestingly too, the avenue where the state parliament is located was named after his father (see Figure 8.13).

Figure 8.13 A Maggi empire? On the left the Amaggi group headquarters strategically located in the Political Administrative Centre in Cuiabá. The picture on the right depicts the main entrance of the state parliament (the ALMT), also located in the CPA, more specifically on André Maggi Avenue.



Source: the author (May, 2012).

Blairo Maggi was Governor of Mato Grosso between 2003 and 2010, with a fundamental role in the 'greening' of the state's agricultural production, as well as being the mind behind the idea of the CAR, and has been state senator in Brasília since 2011 (PR party, but soon to move to the PMDB party). Not surprisingly, his electoral campaigns are well-funded. Thus, for example, he received official

[249] According to the magazine Veja (2 March 2015), citing Forbes magazine, Blairo Maggi has an estimated wealth of US$1.2 billion, while his family's total is US$5.7 billion, in http://veja.abril.com.br/noticia/economia/blairo-maggi-estreia-na-lista-da-forbes-em-familia/. For more on the Maggi family empire, see the magazine *Dinheiro Rural* (July 2012): http://revistadinheirorural.terra.com.br/secao/agronegocios/o-imperio-da-familia-maggi.

donations in the 2010 campaign of US$ 1.49 million from companies in the agribusiness sector, including ethanol producers[250].

In this agriculture-oriented context, farmers in both case studies seem to have adopted the narratives and discourses propagated by agribusiness and share the same 'settler culture' mentality, e.g. their antipathy concerning deforestation control and environmentalism in general. Hence, both NGOs and environmental agency officials lament the particularly difficult context in which they have to operate. Not unusual were the remarks of the Ibama official in Sinop (2012, see Figure 8.14) who stated that he always felt a sense of fear about working against the interests of big landowners. He corroborated that complex interests including politicians and big landowners created an agricultural hegemony in the state and told me of the death threats he had received from big landowners since 2007[251]:

> I confess I was very affected this year by that. In the other years I would not take it so seriously, but it is something that drains your motivation because you do a lot but it does not get results because of the inefficiency or lack of conditions of the state, it is difficult to make things move. And there are many discourses in the region that Ibama is 'against production'.

Figure 8.14 The Ibama office in Sinop. "The environment deserves respect".

Source: the author (July, 2012).

The difficult situation for environmental authorities and environmentalists amidst an agribusiness hegemony means that the apparatus created to control deforestation faces significant obstacles and there is no real creation of 'environmental subjects'. Instead, farmers maintain a 'settler culture'

[250] Louis Dreyfus Brasil, Biocamp Dagranja Agroindustrial, Usinas itamarati, or Case Study 2's Barralcool (official data, according to http://www.republicadosruralistas.com.br/ruralista/18).
[251] Formad member 2 (2012) also stated that she had received death threats twice for campaigning against agribusiness interests.

antipathy - promoted by agribusiness and its political representatives - against environmentalism in general and deforestation control in particular, but also against 'other' peoples' territorialities.

The power of regional agribusiness also marks a geopolitical sort of conflict, one about control of the nation-state over the Amazon. Here, a 'counter' discourse is propagated by Mato Grosso's agribusiness contesting environmentalism and federal-led deforestation control in particular. In this sense, there seems to continue a seemingly endless struggle for control of the Amazon between a centralised nation-state and the region oligarchies, as Arnauld de Sartre and Taravella (2009) suggest.

And both regional powers and the Federal state seem to use the anti-international narrative but in different ways. As seen in Chapter 5, the Federal state, amidst international concerns over deforestation in the Amazon, proclaims a 'modern' sovereignty over the Amazon, constructed around the adoption of the 'sustainable development' paradigm (Arnauld de Sartre and Taravella, 2009). Hence, the use of the Army and Federal power, as sovereignty must be declared not only against foreigners but also against local oligarchies. The PPCDAm here is also a crucial element in guaranteeing control over the Amazon, as seen in Chapter 5, with a number of intelligence and military actions aimed at unveiling and punishing deforesters, who often are big rural landowners[252].

The regional oligarchies (agribusiness and their political representatives) remain on 'the other side', criticising foreign concerns about the Amazon and at the same time the punitive Federal stances regarding deforestation, fostering instead a strategy of de-territorialisation that dispossesses traditional peoples while 'deconstructing' the Amazon so as to legitimate expansion (e.g. through political manipulation of the ecological concept of biome; and weakening of environmental provisions, such as the Forest Code).

A case in point was the project of a state Ecological-Economic Zoning Plan (ZEE) defended by agribusiness and their advocates in the state parliament which they control (the approved version was Famato's proposal). It ended up legitimising agribusiness expansion by considering a great part of Mato Grosso's territory as a consolidated area (hence with fewer land-use restrictions) and dismissing

[252] There are also other environmentalisms in the Amazon, namely linking local socio-environmental struggles to global environmental activism, especially against mega-development projects in the Amazon – a 'glocalisation' of environmental policy scale (Brown and Purcell, 2005) - but the socio-environmental agenda has little to do with the farmers studied in this thesis and more with traditional peoples (see Hall, 1997; Hecht, 2011) that occupied Mato Grosso before the arrival of the southern settlers.

conservation unit or indigenous land creation in a state that has already a reduced surface area dedicated to protection (ICV member, 2012; Formad member 1, 2012: SEPLAN official, 2012; ALMT parliamentarian 5, 2012). It went directly against Federal guidelines and is now contested by the Public Prosecutor's office and by the national CONAMA, such that Mato Grosso remains with no effective plan.

However, it must be noted that these conflicts are not so much between national and regional scales but more horizontal (Arnauld de Sartre and Taravella, 2009), as agribusiness interests exist not only in Mato Grosso state but also in the Federal government (hence its internal contradictions), as was seen in Chapter 5. And conversely, environmentalists do exist in both Mato Grosso and Federal administrations.

The contradictions of the deforestation control apparatus thus seem to lie on the divergent stances in and between administrative levels. Hence, while the state CAR is intended to facilitate, legitimise and 'green' agribusiness; the necessary coordination with the Federal command and control structure is complicated notably because it is seen as an imposition and a hurdle to (agribusiness) development in the state of Mato Grosso. The agribusiness overall strategy is to expand production areas, notwithstanding the 'degraded land' rhetoric depicted in Chapter 6. Due to the lack of a Mato Grosso state zoning plan, biofuel production stands in this regard as a further pressure on (direct and indirect) expansion as it remains with limited instruments disciplining its land-use (see Chapter 6).

8.5 Summary

This chapter has explored the deforestation apparatus implemented in Mato Grosso, an evolving system with an often complicated and contested coordination with the Federal authorities. Such lack of coordination, and the instrumental use of the Mato Grosso system to legitimate ongoing agricultural production and expansion, remain a hurdle for effective deforestation control in that state.

In Case Study 1, none of the farmers had an environmental license or had completed the CAR process, albeit for different reasons. Most remained blocked in the process due to land title issues and many were not complying with the Forest Code. Most were reluctant to accept the stricter enforcement of deforestation control, despite living the context of a blacklisted municipality – acting with the NC to remove Nova Ubiratã from that list - and lamented the high importance given there to

deforestation control. They identified problems of bureaucracy, lack of coordination and corruption in the licensing process. At the same time, and absent from all this process, the biodiesel industry continued to be supplied by these farmers through the social biodiesel stamp, while providing in turn alternative credit to non-licensed farmers.

In Case Study 2, the biofuel industry (contrary to Case Study 1), was deeply involved in the environmental regularisation of farmers through a Protocol signed with the state SEMA. And yet, difficulties in environmental licensing mirrored those identified in Case Study 1 – perceived excessive bureaucracy, time-consuming procedures, policy uncertainty, and lack of coordination among agencies. For a number of reasons, most notably the effect of the Protocol, farmers were here in a more advanced state of environmental compliance than in the first case study.

Finally, this chapter assessed the ambivalent environmentalism of the agro-industry in Mato Grosso. Despite some instrumental 'greening', there is a shared sense of unfairness, a 'us versus them' tone regarding environmentalism and deforestation control in particular. This is rooted in a 'settler culture' that emulates the 'brave' occupation of Mato Grosso's territory by southern settlers, propagated by the powerful agribusiness lobby and adopted freely by farmers from both case studies. Mato Grosso remains a difficult place to operate effective deforestation control which is often seen as a Federal imposition.

Overall, this chapter has highlighted how the impact of deforestation control policy on biofuel holdings is specific of the local context of implementation – a blacklisted municipality in Case Study 1 and an engagement of industry in Case Study 2. Stronger enforcement seems to have a deterrence effect on farmers but the implementation issues depicted in this chapter – from perceived excessive bureaucracy and unequal enforcement to a lack of coordination between agencies – means that the real potential of deforestation control policies to deter deforestation in the case study areas is somewhat diluted. Given the absence of effective provisions tackling land-use impacts in biofuel policies as seen in Chapter 6, and the local contradictions seen in Chapter 7, Forest Code enforcement remains the most effective way to control the land-use effects of biofuel expansion. But the 'complications' arising in the field – and notably the farmers' lack of LAU or CAR - mean that it is not possible to actually guarantee that there is no GHG emission contradiction from biofuel production. The 'limits' of command and control in the case studies in turn relate to the broader anti-

environmentalist stance among farmers, showcasing a struggle between Mato Grosso state (and agribusiness) ‘development’ visions and Federal control.

Chapter 9. **Conclusion**

This thesis has investigated the connections between biofuels and deforestation control policies in Brazil illustrating how these two GHG emission mitigation choices can lead to contradictory outcomes. By doing so, it has aimed to contribute to knowledge on the politics of land-use impacts of biofuel production in Brazil – a country that is simultaneously a world biofuel leader and the leading centre of global biodiversity due to its still vast forests – stressing the key role of local social dynamics, land tenure systems, as well as wider geopolitical discourses and practices. The previous four chapters in particular provided an empirical basis for analysing the key research questions (RQ) of this PhD. Briefly, those questions are: 1) to what extent Brazil's drive to promote biofuels and Brazil's deforestation control objectives relate to a wider natural resource driven geopolitics designed to enhance the country's international stature; 2) to what extent and in what ways do biofuel policies encompass deforestation concerns; 3) how are these concerns translated on the ground, and in particular, how do location-specific biofuel socio-political dynamics in each case study shape land-use; and 4) how far do deforestation control efforts impact on biofuel crop production.

The present chapter concludes the PhD by summarising the main findings of the thesis. In doing so, it provides a final assessment of the significance of these policies in Brazilian natural resource geopolitics, as well as their national and local articulation including contradictions. Finally, this chapter considers possible avenues for future research emanating from this thesis.

9.1 Key findings and limitations

This study deployed an analysis notably based on political ecology and critical geopolitics approaches to understand the connections between biofuels and deforestation control policies – two GHG mitigation instruments in the Brazilian climate change regime that could prompt contradictions, notably relating to land-use choices. Decisions on how land should be used (i.e. whether for food, biofuel production or environmental conservation) reside at the heart of these contradictions and are intertwined with policy and market signals, land tenure systems and geopolitical discourses and practices.

The complexity of the issue here raised important questions as to how to grasp both the material and discursive aspects of biofuel land-use dynamics. This PhD sought to provide a flexible,

interdisciplinary and in-depth approach, using a qualitative methodology centred around two case studies located in the state of Mato Grosso: one for biodiesel derived from soybeans and another for ethanol derived from sugar cane.

Chapter 5 commenced the detailed empirical analysis insofar as it aimed to cast light on how biofuels and deforestation control policies relate to a natural resource driven geopolitics designed to enhance the country's prominence (RQ 1). As the findings show, the policies have their roots in an unresolved conflict between competing sets of values and aspirations within Brazil as to how the country should develop and present itself abroad. Biofuel development and deforestation control ultimately became part of a Brazilian green soft power strategy seeking to increase the country's international prominence. It was underpinned domestically by a sense of pride in the abundance of its natural resources and a desire to assert its authority on the world stage as an emancipated, economically powerful and forward-thinking nation.

Yet, this international strategy for political, economic and environmental prominence faces serious social and political challenges domestically which were also illustrated in Chapter 5. Notable here were domestic political tensions, linked to conflicting interests and perceptions regarding the importance of deforestation control and biofuel policies. These differences between international rhetoric and domestic dynamics are significant – not least because of the country's 'outspoken' manner with which it has enacted its green soft power strategy.

In this regard, the role of the Amazon forest in Brazilian geopolitical objectives is ambiguous. On the one side, there is a commonly-held view that Brazil, as a sovereign country, should be fully exploiting the potential of its own resources, while on the other, the country is keen to promote an image of itself abroad as a 'responsible actor', hence showcasing examples of successful deforestation controls framed as 'sustainable development'. The chapter suggested that the latter was habitually '*para inglês ver*' rhetoric, even as it served as a geopolitical tool of federal state control in the Amazon *vis-à-vis* local oligarchies (Chapter 8).

Biofuel policies add further complexity to this story as they reside at the heart of national energy security objectives, while drawing on the 'immense' economic potential said to be contained in abundant land and diverse climates that could give rise to large-scale and diversified development. This would enhance, in turn, the country's international prominence, especially in the case of ethanol

for which Brazil has been keenly seeking an international market. And yet, both national dynamics (e.g. consumption patterns, political struggles) and international challenges (e.g. shifting global energy prices, 'fickle' European markets) were seen to be obstacles in the sector, with a knock-on effect in terms of the land-use equation.

In contrast, Chapter 6 assessed whether biofuel policies have succeeded in integrating environmental conditionalities in order to prevent deforestation – thus addressing RQ 2. It focused notably on the contradictions arising from the use of land for biofuels – whereby GHG emissions resulting from a given land-use change are, in practice, higher than the carbon savings from replacing fossil fuels – and how this aspect is perceived, and perhaps addressed, by either the Brazilian authorities or non-state actors such as agribusiness.

Mirroring the findings of Chapter 5, an international impetus for environmental policy development was identified as the main driver of action. That said, few environmental provisions (i.e. the sugar cane zoning - ZAE) were in place for ethanol production and even these faced strong opposition from various state and non-state actors; meanwhile, biodiesel production, which was intended purely for national consumption, was excluded from such provisions.

Instead, the chapter found policy dynamics were underpinned by five discourses that legitimised biofuel expansion around a core argument that there is no conflict between land-use for food and biofuels and the conservation of forests. These discourses reflected a historic perception about land availability and use on 'the frontier', geopolitical representations of land abundance, and an uncompromising belief in technology as a means of counter-posing concerns over land-use.

Chapter 6 critically analysed these discourses finding that GHG contradictions can occur when land is used for biofuel production (dLUC and iLUC) which can be linked to excessive optimism over the availability of degraded pastureland and the promises of ecological modernisation. Therefore, the fuel-food-forest triad contradiction, even in land-abundant Brazil, was found to be significant, especially given the strong economic drivers that exist for biofuel crop expansion combined with a highly unequal land access and tenure system.

Hence, disciplining biofuel expansion in order to reduce its possible impact on land-use was found to be problematic. Biofuel land-use contradictions emerge and remain mostly connected to private

property decisions and associated commodity markets, and to a lesser extent reflect biofuel policy signals. The State has used zoning rules, made credit dependent on environmental conditionalities, and sought to enforce existing environmental legislation (especially the Forest Code, discussed in Chapter 8) – but to generally limited effect.

Indeed, Chapter 6 clearly highlighted that Brazil cannot claim with certainty that there are no land-use contradictions from biofuel deployment. Further evidence is needed here in order to build a more comprehensive analysis. Yet, Chapter 6 also argued that no macro-scale assessments can be insightful without considering too land-use dynamics on the ground. Chapter 7 hence looked at the political ecology of location-specific biofuel land-use exploring how particular biofuel socio-political dynamics shape land-use in each case study, thus answering RQ 3. In doing so, it provided local empirical evidence designed to complement the analysis of key discourses conducted in Chapter 6.

The analysis encompassed the range of actors involved as well as the institutional arrangements that have been set up (including land tenure and access regimes), permitting thereby a more detailed understanding of the drivers of land-use change. Chapter 7 thus presented a complex picture: different policies, market behaviour, land tenure systems, where farmers originally came from, institutional arrangements and local socio-environmental contexts, all here found to play a part in the overall land-use outcome.

How farmers perceived this complex picture was seen to be vital to what occurred on their land. Chapter 7 hence investigated their perceptions (and other local actors) about local land-use change, and attempted to ascertain how they made land-use decisions.

In Case Study 1, the chapter identified social contradictions related to the expansion of soybean monoculture, notwithstanding the PNPB's initial objective of improving the revenue of poorer farmers through alternative oil-bearing crops. These contradictions lead in turn to environmental contradictions, such that, ironically, the PNPB constitutes a further driver of soybean expansion and corresponding dLUC and iLUC impacts. At the same time, the biodiesel industry was found to be by-passing the Forest Code by providing *pacotes* to farmers lacking an environmental licence.

Case Study 2, in contrast, had an older occupation history, which meant that dLUC seemed now to be a residual phenomenon. Furthermore, expansion of sugar cane is believed to be possible on available

degraded pastureland but in reality it is limited due to the system of Barralcool quotas and the fact that the region is zoned by the ZAE. Finally, a greater interplay of biofuel crops with the cattle sector was visible in Case Study 2, contributing to the displacement of subsistence family farmers in the past and most probably iLUC.

Given this analysis, it fell to the Forest Code to tackle deforestation from biofuel crop production (and other agriculture crops). Hence, Chapter 8 added deforestation control policies into the equation by evaluating how far these policies are implemented, as well as contested, locally by biofuel crop farmers.

The circumstances varied in each case study. Biofuel specific provisions were identified only in Case Study 2 where an ethanol industry agreement existed due to international and national pressure on the poor deforestation record of the state of Mato Grosso as well as the generally higher visibility of ethanol environmental issues. By contrast, in Case Study 1, industry was absent from deforestation control strategies; rather it was the municipal administration, with the help of an international NGO, who were here involved and prodded into action by the fact that the municipality of Nova Ubiratã had been blacklisted due to its high deforestation rates.

Chapter 8 also examined how deforestation control policies affected biofuel crop holdings. The history here was a mixed one. While those policies seemed to have deterred further deforestation (i.e. by making illegal deforestation riskier or by making it more difficult to obtain permission to deforest legally), its enforcement was seen by farmers and other local actors as unequal and ineffective. ‘Excessive’ bureaucracy, the overlapping roles of government agencies that lack co-ordination, uncertainty caused by an ever-changing legal context, as well as corruption were some of the key issues raised by interviewees as complicating deforestation control in both case studies.

Perhaps, most significantly, the chapter identified in both case studies widespread antipathy towards deforestation control and environmentalism in general. Environmental policy is often bitterly contested by biofuel crop farmers illustrating thereby the failure of the state to create ‘environmental subjects’ consonant with the task at hand. Indeed, ambivalence towards environmentalism was widespread in Mato Grosso. Despite an apparent ‘greening of business’ and of the state, counter-discourses of agribusiness extolling the need for and virtues of unrestricted development were embraced by diverse actors, resonating with the domestic struggles depicted in Chapter 5. Local political dynamics, the

historical context of the occupation of Mato Grosso, and its current globalised agribusiness focus, as well as issues of cultural identity are key here, resulting in deep resentment about all environmental policy. Here, the geopolitics of Federal State control over the Amazon, *vis-à-vis* the power of local oligarchies and agribusiness comes to the fore. These findings provide local empirical data and complement Dauvergne and Neville's (2010) internationally-centred analysis of the role of the State and decentralised biofuel politics. In doing so, the findings also provide further examples to Arnauld de Sartre and Taravella's (2009) account of the environment as a 'weapon' which is used in struggles between the two Brazilian governmental levels.

Given the complexity of the research – with multiple policies and actors being analysed at different scales – the structure of this thesis was found to be most appropriate in approaching core concerns and in organising data collection. To summarise, it began with the national-international connection (Chapter 5), before exploring the national articulation of policies (Chapter 6), then moving on to local-level case study data on biofuel land-use (Chapter 7) and ending with the assessment of deforestation control in biofuel crop holdings (Chapter 8). These four empirical chapters are, in turn, bound together by two broad and inter-connected themes.

Firstly, this thesis has identified policy implementation issues concerned with translating national policies into local practices. In doing so, it has shown how 'complications' arise as distinct policy areas (deforestation control and biofuels) mingle in the context of two distinct implementation pathways (biodiesel and ethanol). The consequences are significant for the articulation and effectiveness of Brazilian national and international objectives. Policies do encounter obstacles and challenges, and unintended interactions can appear on the ground. However, there is a large degree of intentionality behind what in reality seems to amount to a *laissez faire* approach, as '*para inglês ver*' is the norm. Environmental programmes may thus be adopted but not really wanted by many of the actors involved. Here, then, can be seen how the lack of a more forward-looking approach which would be required to deal at all seriously with the effects of climate change is connected in Brazil to the commonly-held representation of a naturally endowed country seemingly 'blessed' with unlimited resources.

Secondly, this 'weakness' of environmental policy relates to a wider geopolitics and specifically the role of the Brazilian State in the international system. Complex political positioning is explained by

long-established geopolitical practices and representations, as well as notions of 'modern' development, which are mostly unrecognised internationally, but which are crucial for understanding Brazil's ambiguities (Zhouri, 2010).

There is indeed a big contradiction here: deforestation control limits agribusiness expansion but gives Brazil a better international image; conversely, agricultural expansion in general and biofuel crop in particular enables Brazil to strengthen its economy and thereby prominence in the world but raises international concerns regarding the Amazon and how Brazil is managing it. Conflicting sorts of geopolitical reasoning, discourses and practices reflect in turn what Skocpol (1979: 32) refers to as the "Janus-faced state": turning outwards for external relations and inwards for domestic politics. Indeed, '*para inglês ver*' here can be seen as a device or means of negotiating these two 'forces' by key state actors working at the interface of outwards and inward action (Freitas and Mozine, 2015). This reflects Brazil's centuries-old quest for emancipation and contemporary ideas of developmentalism and national sovereignty – a sort of postcolonial strategy and representation of Brazil internationally. Such strategies are of course not exclusive to Brazil. Yet, Brazil is indeed a special case in the South given its active quest for international prominence combined with the sheer size and wealth of natural resources that even today makes it the 'country of the future'.

Inevitably, a PhD of this complexity is unable to cover all facets of the story in as much depth as would be desired. Indeed, this thesis could not cover all nuances of social interaction in the interplay of biofuel land-use and deforestation control policies. Restrictions on the amount of time and resources available for research, as well as the need to deliver a thesis within an agreed timescale prevented an examination of the entire range of social dynamics at play. Hence, more attention could have been given, for instance, to the role of taxation or credit mechanisms in biofuel crop production as well as to agriculture policy in general (which impacts biofuel crop production even if not specific to it) or policy mechanisms aimed at land-use control in general. These notably include the soy moratorium and the Mato Grosso state ZEE.

Furthermore, only the command and control measures in Axis 2 of the PPCDAm were considered in my examination of the impact of deforestation control policies on biofuel crop holdings in Chapter 8 as these were most relevant to the case studies and to the thesis theme. In fact, Axis 1's *Terra Legal* Programme and Axis 3's promotion of sustainable activities did not affect farmers in the case studies

and can thus be seen as only marginal to the specific concerns of this PhD – notwithstanding their overall relevance for understanding the deforestation control challenges in Mato Grosso.

I am aware too that it is not possible to attain a full policy analysis given the above-mentioned constraints. And yet, I was not interested in building a genealogy of each policy at stake here. Instead, I was more interested in the interstices between these policies, the connections and the contradictions that arise when they are implemented at the same time, and at different scales. Relations here mattered here more than particular objects or actors (and given the diversity of actors intervening it would not have been possible to study each one individually). Therefore I had to maintain a selective approach when deciding which policy strands to examine, the actors to interview, and the documents to analyse (see Chapter 3).

This also relates to the matter of the methodology chosen for this PhD. Thus, I am aware that a qualitative approach, focussing on political struggles, discourses and relations is only one way of looking at the biofuel-deforestation nexus in Brazil. Thus, econometric approaches associated with land-use GIS models were a different option. And yet, I feel that they provide little explanatory potential, neglecting such things as politics, geopolitical representations and unequal power relations.

At a practical level, a longer period of fieldwork would have been helpful so that (for instance) each farmer's land-use trajectory could be more fully clarified, but due to time constraints, data here needed to correspond to a 'snapshot' taken in 2012. With more time, I could have explored (and cross-checked) more deeply farmer perceptions and practices as well as delving into more fully cultural issues including the place of origin (see below).

Nonetheless, the detailed empirical evidence that I was able to collect for this thesis successfully demonstrates the existence of biofuel land-use contradictions and a convoluted political approach to the issue by Brazilian state and non-state actors. It also highlights divergent national and international strategies while drawing attention to the difficulties and contradictions within context-specific biofuel land-use dynamics and deforestation control in the two Mato Grosso case studies. The diverse outcomes on the ground, as evidenced by the experience of soybean biodiesel production in Nova Ubiratã and sugar cane ethanol production in Barra do Bugres, illustrate the nature of the obstacles facing Brazil as it formally works towards implementing national policies while meeting international

commitments. It ultimately casts doubts about the real GHG emission reduction potential of Brazilian biofuels.

9.2 Contribution and next steps

The contribution of this thesis is important for a number of reasons. Empirically, it firstly innovates by being the first study of its kind to connect in a Brazilian context biofuels with deforestation control policies and to link this interaction with a broadly-defined geopolitics of natural resources. In doing so, it also enables a comparison to be made between ethanol and biodiesel policy dynamics, thus aiding in the provision of greater precision about 'biofuels'. Indeed, and while the impact on the land of biofuels in general has attracted international scholarly and NGO interest, these impacts always need to be situated since different feedstock and biofuels lead to a diversity of land-use outcomes.

As such, this PhD ought to be a welcome addition to scholarly debates that have hitherto mostly focussed on the direct and indirect land-use impact of biofuel production, especially with quantitative and GIS modelling approaches, but not on the connection of biofuel and deforestation policies, or how power relations and territorial and discursive factors shape that interaction. This thesis thus provides a more discriminating approach, empirically rooted and historically contextualised, linking geopolitical practices and discourses by state and non-state actors to biofuel land-use and deforestation policy dynamics in a specific place.

Secondly, the contribution of this PhD is also important due to its specific research setting. Notwithstanding the economic and political crisis it is currently facing, Brazil is a key international player: economically, environmentally, and politically. At the same time, it is one of the world's most important countries in terms of biofuel production. As such, it requires in-depth analysis of the kind developed here at the interface of these areas, all holding global significance. Indeed, the thesis has raised intriguing issues concerning geopolitical positioning – Brazil having an outspoken green soft power strategy in international environmental negotiations on the one hand, and yet showcasing flagrant contradictions domestically in terms of policy practice, on the other. In presenting the first in-depth empirical study of how these policies interact via two case studies, it is possible to achieve a better understanding of how local contexts shape biofuel land-use and deforestation control policy dynamics, and how these in turn create obstacles to the international objectives that Brazil seeks to pursue.

This thesis also contributes more generally to political ecology, the main element of the theory framework set out in Chapter 2. The literature here has often focused on the political economy of biofuel expansion, especially in the South (Holt-Giménez and Shattuck, 2009; Dauvergne and Neville, 2010; McMichael, 2010; White and Dasgupta, 2010). Notably, the 'biofuel question' is hence investigated mainly in terms of the overall global spread of agrarian capitalism and land grabs at the expense of local communities. Yet, in so doing, not enough attention is given to the role of geopolitics in the equation (for an exception, see Neville, 2015). The point of this thesis is partly about correcting this perceived deficiency.

This thesis has hence revealed that geopolitical practices and discourses by state and non-state actors need to be considered for a more comprehensive analysis of biofuel land-use politics. It considered the historically-rooted geopolitical representations that shape perceptions and uses of land, as well as the outcomes of historical geopolitical practices (e.g. Mato Grosso's state-led colonisation by southern settlers) and historical legacies of land tenure which also shape current land-use practices and disputes.

In the process, I additionally emphasise the role of the farmers who produce biofuels rather than those who are displaced in this process, which have been the focus of abundant literature (see the reviews by Borras et al., 2010; McMichael, 2010; or White and Dasgupta, 2010). The point is not to deny the importance of the latter as a research topic. Yet, little has been written about what the 'newcomer' farmers have done in the past, and do today, although it is surely important to understand their position as they are an essential part of the Brazilian biofuels 'jigsaw'.

The 'who' in the question is therefore essential, especially as identity and class differences help shape 'how' land is used. Dauvergne and Neville (2010) have called for a 'disaggregation' of the peasantry, arguing that the question of who benefits from biofuels is highly contingent upon unequal social relations and land tenure. The differentiation of farmers and the different territorialities that subsist in the field mean that farmers are differently affected by the biofuel rush and associated governmental initiatives.

In Case Study 1 in particular, biodiesel industry and the support of the PNPB have fostered the expansion of soybean monoculture in family farming holdings, with consequent socio-environmental impacts. This thesis thus complements literature about the deepening of the 'metabolic rift' caused by

biofuel expansion (e.g. McMichael, 2010), illustrating *in loco* the emergence of a particular kind of 'accumulation by dispossession' – a non-violent process in which industry's support to family farmers, through land-lease or production contracts, promotes a *de facto* agribusiness monoculture expansion.

In doing so, this thesis has provided evidence of the failure of the PNPB, which was designed as a socially-oriented biofuel programme. Indeed, it has highlighted that 'small-scale' production (and the quite 'slippery' notion of 'family farming') and cooperative and rural union efforts are not always conductive of sustainable biofuels and livelihoods. This thesis, therefore, contributes to the literature on the benefits of decentralised, socially-oriented biofuel policies. The local empirical data corroborates McMichael's (2010) and Wilkinson and Herrera's (2010) initial concerns, and complements more recent literature that has identifyied socio-environmental contradictions but have mostly focused on other feedstocks and regions of Brazil (César and Batalha, 2010; Schaffel et al., 2012; Leite et al., 2013; Stattman and Mol, 2014).

Finally, and in light of the various findings and contributions of this PhD, some issues were identified that need further research. To begin with, work ought to update this PhD given the rapidly evolving situation in Brazil since fieldwork was completed at the start of 2013. Such an update should include: the 2013 hike in deforestation in the Brazilian Amazon; the implementation of the federal CAR following the approval of the new Forest Code; the more recent outlook for ethanol production which seems to be recovering from the crisis but still with major problems; or even the serious water shortage in 2013-14[253], especially in São Paulo, which scholars blame on deforestation[254].

Then, too, research needs to account for the fact that the political momentum is different from the time of this thesis. Following the Brazilian 'take off' (illustrated on the cover of *The Economist* [12 November 2009]) depicting Brazil's confidence in its potential to become a world economic and political 'power', by 2015 scepticism has seemed to have set in (see *The Economist* article "The crash of a Titan" of 28 February 2015), as economic growth stalled (recession expected in 2015) and the Petrobras scandal (see section 5.4) made national and international headlines. Following the June 2013 protests, there was an eventful 2014 presidential campaign, culminating in a narrow victory for Dilma Rousseff. Widespread dissatisfaction has been evident in 2015, within a polarised society. The

[253] See more on *The Guardian* (5/9/2014), in: http://www.theguardian.com/weather/2014/sep/05/brazil-drought-crisis-rationing, accessed 23 August 2015.
[254] *Observatório do Clima*, press release of 9 March 2015, in: http://observatoriodoclima.eco.br.

government has suffered significant defeats in the National Congress as its coalition partners seem to have held the government hostage in order to fulfil their own interests. Amidst such turmoil, combating deforestation and fighting climate change in general may have become less important, and hence, the Brazilian international green 'soft power' a lesser priority.

Indeed, it is still uncertain how the Brazilian climate change regime – and the role of biofuels and deforestation control – will evolve. Recent announcements of the Brazilian GHG mitigation targets ahead of the Paris COP to be held at the end of 2015 provide perhaps an indication that the *status quo* is to be maintained – commitments '*para inglês ver'* without compromising Brazil's chosen path of economic growth. In fact, Brazil is set to adopt 'zero tolerance' of illegal deforestation – i.e. the country has proposed continuing with the existing requirements but no new targets have been set to reduce legal deforestation. By accepting a continuation of the levels of legal deforestation, the Brazilian state acknowledges that the areas which have already been cleared are not sufficient for the country's development strategies. Brazil is also set to reforest 12 million hectares (which in the end represents only half of what is already stipulated by the new Forest Code in terms of recovery of holdings); and to increase the contribution of renewable energies, notably wind and solar (it is still uncertain what this would mean in relation to biofuels)[255].

These new developments must be included in future research in order to update the analysis of this thesis. Future research could also draw on topics that emerged from the fieldwork but were not deeply explored in the thesis. Firstly, there is the issue of identity. As seen in Chapters 7 and 8, identity (and the 'settler culture') plays a significant role in land-use dynamics and deforestation control in the case studies but it remained unclear how particular identities – e.g. *gaúcho* in Case Study 1, or *paulista* in Case Study 2 – might underpin different territorialities and hence land-use patterns (Chapter 7) as well as influencing opposition to environmentalism (Chapter 8). As this thesis was not primarily concerned with identity, the research questions and design did not foresee a particular role for this issue. But when living with farmers during my fieldwork, it became apparent that these aspects needed deeper examination. Even if this issue is not specific to biofuel crop production, it is nevertheless related to agricultural expansion so it is a relevant factor.

[255] *Observatório do Clima*, press release of 30 June 2015, in: http://www.observatoriodoclima.eco.br/dilma-frustra-apelo-por-ambicao-em-declaracao-com-obama/.

In this regard, further research could once more draw on both political ecology and critical geopolitics, notably around the concept of territoriality, but with a deeper ethnographic approach. Territoriality – "the collective effort of a social group to occupy, use, control and identify with a specific parcel of its biophysical environment" (Little, 2002: 3; see too Silva, 2007) – does indeed matter, shaping land-use practices and social relations with nature. Territorialities may provide insightful explanations on the difficult creation of 'environmental subjects' depicted in Chapter 8 as they connect to counter-strategies against Federal state deforestation control (see Matose, 2014 for a 'resistance politics' case in Zimbabwe).

Another topic that arose when I was in the field was that of the use of GMO soybeans in Case Study 1. While not directly related to my research topic, it nevertheless sparked curiosity about the possible impacts of the PNPB in terms of the expansion of GMO soybeans. In fact, farmers declared they were producing GMO soy because it was for the internal market, including biodiesel production, which features less stringent controls; while soybeans to be exported to Europe would preferably be 'conventional' (i.e. non-GMO). The spread of GMO crops around the world, and notably in Brazil where they have been cultivated intensively, is a popular research theme (e.g. Jepson and Brannstrom, 2005) and concern for NGOs. Knowing better how it inter-relates with the Brazilian PNPB programme would provide a fascinating new research theme but also a timely contribution to understanding the full range of environmental contradictions of that biodiesel programme.

Finally, another promising line of investigation concerns the legitimation of biofuel expansion in both the Amazon and the Cerrado and the various arguments that have been put forward concerning their boundaries and uses. Leading on from Chapter 6, the Cerrado is seen as land that could be appropriated for agricultural expansion, together with degraded lands in the 'available land' narrative where biofuel expansion is seen as fully justified. As seen in Chapter 4, this biome occupies a significant portion of Mato Grosso and is important nationally (originally occupying 22% of the Brazilian territory) for a number of reasons – headwaters of major rivers, biodiversity, and carbon storage. Its 'lesser importance' compared to the Amazon, in the eyes of Brazilians, was even corroborated in the 1988 Constitution[256]. This differential treatment is the result of a 'high forest bias' whereby there is overwhelming (international and national) interest in conserving high biomass and

[256] The Constitution declared the Amazon, as well as the Atlantic forest, the Pantanal and the coastal zones (and hence not the Cerrado) as national heritage, thus their use must be under conditions that secure environmental preservation, including the use of natural resources (number 4 of Article 225).

humid tropical forest like the Amazon (Hecht, 2005), while the semi-deciduous forests and savannah woodlands in the Cerrado are seen as suitable for agricultural expansion. And yet, there has been limited research on the struggles regarding the definition of biome, as it is understood by farmers as well as other actors in Brazil, highlighting a promising new research theme.

Indeed, and given that both case studies of this thesis were in 'transition' areas between Amazon and Cerrado biomes, one of the issues experienced by farmers in the environmental licensing process, generating confusion and conflicts, was the vegetation typology definition and the boundaries of biomes. This has direct implications for the legal implementation of the Forest Code (the percentage of Legal Reserve varies from a stringent 80% in forests to just 35% in cerrados, in the Legal Amazon). Not surprisingly, there are competing notions and differential valuations of these biomes, struggles regarding biome and vegetation typology borders, and the consequent (geo)political use of vegetation maps. Given the unpopular restrictions in 'the Amazon', farmers contest its borders and 'push it away' from their holdings. Furthermore, Brazilian agribusiness – the CNA and its political arm in the National Congress, the Ruralist Front – has maintained a discursive campaign aimed at increasing the possibility of agricultural expansion in the Amazon. The re-definition of the Amazon that has been advanced by agribusiness – from the Legal Amazon to the Amazon biome (hence underpinning a political appropriation of the ecological concept of biome) – certainly plays a key role here. However, as seen in Chapter 5, the strategy also includes claiming areas for agribusiness that had been designated for traditional peoples or as conservation units; and the loosening of environmental regulations (e.g. the new Forest Code) (Coutinho, 2006; Almeida, 2010; Sauer and Almeida, 2011; Walker, 2011).

The political use of the concept of biome is yet another facet of the politics of biofuel land-use in Brazil, and can provide further elements to the academic discussions on the social construction of nature (see Castree and Braun, 1998). While more research is needed to explore the particular issue of biome contestation, this thesis has stressed the need to investigate other constructions when analysing the politics of biofuel land-use. Indeed, geopolitical representations of natural resources, and narratives of biofuel and commodity land-use effects help legitimise biofuel crop expansion.

These are part-and-parcel of the above-mentioned agro-strategies aiming at legitimising agricultural expansion in the country, thus constitutive parts of the 'geopolitical puzzle' surrounding land-use in

Brazil. In this regard, this thesis has noted the role of the state and its ambiguous relations with agribusiness and regional oligarchies on the one hand, and international environmental negotiations on the other. In doing so, this thesis has unveiled the paradoxes that exist within this resource-rich country: biofuel crop and agricultural expansion in general do impact forest preservation and are intertwined with unequal land tenure systems and geopolitical discourses and practices. As conflicting political strategies are implemented, policy contradictions arise, making the topic complex and indeed political. Consequently, this thesis suggests that the real GHG emission reduction potential of Brazilian biofuels remains doubtful, only showcasing the need for further research in this pivotal sector at a time of growing worldwide anxiety about climate change and the human contribution to it.

Appendix A. List of guide questions

General

- How would you describe Brazil in terms of its natural resources?

- Do you think these natural assets help Brazil become a world economic and political power? Why?

- Is energy security important for this? How should Brazil pursue it?

- What is the importance of biofuels for the Brazilian/this state/this region economy?

- Do you think biofuels help increase Brazilian stature in the world?

- What else are biofuels important for?

- Do you think there are enough land resources to produce biofuels to fulfil Brazilian needs and exports?

- Do you think there could be more land made available for agricultural production nationally, in general and energy crops in particular?

- What would be the best kind of land to expand agricultural production? Why? (degraded pastureland, forest)

- Do you think the Amazon forest is appropriate for agriculture? How about the Cerrado?

- Do you think it is important to protect the Amazon? Why? And the Cerrado? Why?

- Do you think soybean/sugar cane production leads to more deforestation? If not, why?

- What do you think about the environmental restrictions regarding agriculture in the Amazon biome?

- What do you think about Brazil's international deforestation control commitments?

Specific (farmers)

1) The holding

- Where is your land located, and what is its size?

- How much of the land is cleared for agricultural activities?

- Do you rent any of it? If so, how many hectares?

- When did you arrive to this region and where did you come from?

- What do you produce in your land? Can you describe the agricultural activities throughout the year?

- Any workers besides family members?

- What kind of vegetation existed in the land when you first came?

- When did you start clearing the land and how? To produce what?

- When did you start to produce soybeans/sugar cane?

- Do you have a DAP (Case Study 1)?

- Do you have the title of your land? How did you acquire the land?

2) Forest Code compliance and environmental license

- Do you have a CAR for your holding? When did you start the process? If not, why?

- Can you describe the process and tell me if it is easy? If not, could you describe the main problem(s)?

- Do you have a LAU for your holding, or have started the process?

- Do you think having a LAU is important? Why?

- Do you aim to expand you production? Will you need more land? If so how will you expand? Will it be needed to clear more land? Why?

- What do you feel about deforestation control in this region? Is it inhibiting farmers from clearing?

- What percentage of the LR do you still have? And what about APPs?

3) Production

- How much did you produce last harvest?

- Has productivity increased recently? Why?

- Can you explain to me the machinery and inputs (fertilisers, pesticides) necessary for the production and where do you get it?

- Which credit lines have you access to?

- (Case Study 1) Can you explain the social biodiesel mechanism and how the Cooperative negotiates with industry? Are you satisfied with the *pacotes*? What about technical assistance?

4) General questions regarding the environment

- What would be the best kind of land to expand agricultural production? Why? (degraded pastureland, forest)

- Do you think the Amazon forest is appropriate for that? What about the Cerrado?

- Do you think it is important to protect the Amazon? Why? And the Cerrado? Why?

- Do you think soybean/sugar cane production leads to more deforestation? If not, why?

- Is there enough land to further expand soybean/sugar cane plantations? Here in the region in particular?

- What do you think about the environmental restrictions regarding agriculture in the Amazon biome?

- What do you think about Brazil's international deforestation control commitments?

Appendix B. Glossary

ADM - Archer-Daniels-Midland Company, an American agribusiness company operating in Brazil

Amaggi - Agribusiness corporation owned by Blairo Maggi and family, former governor of Mato Grosso and current senator

***Assentado/assentamento* –** Agrarian reform settler / agrarian reform settlement

***Bancada Ruralista / do Agronegócio* –** agriculture lobby (or 'front') in the National Congress

***Bandeirante* / Bandeiras –** literally 'flag bearer', refers to those who, mainly from São Paulo, swept over Brazil in a quest for gold, precious stones or indigenous workforce

BR 163 – Federal road connecting Cuiabá (Mato Grosso state) to Santarém (Pará state)

Bunge – an American agribusiness company operating in Brazil

Caboclo – Amazonian backwoodsmen, a commonly used term to describe the various racial mixtures between indigenous, Africans and Europeans

Caramuru – A Brazilian corporation processing soybean, corn, sunflower and canola and producing vegetable oil and biodiesel

Cargill – An agro-industry international corporation processing soybeans and other agricultural products in Brazil

Casa Civil – The Brazil Chief of Staff

Cerrado – A Brazilian biome composed of a mosaic of different vegetation types, including tree and scrub savannah, grassland with scattered trees, and patches of dry forest

***Chapada* -** A chapada is a plateau found in the Brazilian Highlands

Cooperbio – Biodiesel producer cooperative based in Cuiabá

***Consórcio* –** A decentralised branch of the Mato Grosso state rural development secretary (Sedraf)

Cuiabano – Refers to the existing inhabitants of the state of Mato Grosso when the southern settlers arrived in the 1970's and 1980s

DETER (*Sistema de Deteção de Desmatamento em Tempo Real*) – A real-time deforestation monitoring system by INPE

Direct land-use change (dLUC) – "occurs whenever land is transformed from one use to another, for example, from forest to agricultural land or to urban areas. Since different land types have different carbon storage potential (e.g., higher for forests than for agricultural or urban areas), land-use changes may lead to net emissions or to carbon uptake" (IPCC, 2012: 961)

Ecotone – Contact area between two biomes

Expansion (sugar cane plantation) - is the sugar cane available for the first time for harvest after plantation

Fiagril - A biodiesel and soybean processing unit in Lucas do Rio Verde

Flex fuel vehicle (FFV) - can run on 100% ethanol, gasoline or any other blend of the two

Forest Code (FC) – The main Brazilian forest protection law, it establishes mandatory Legal Reserves (LR) of vegetation and Permanent Preservation Areas (APPs) in private holdings

Fundo Amazônia – A funding programme for projects of conservation and sustainable use of forests. Managed by the BNDES, it is financed by donations, notably from the Norwegian and German governments and from Petrobras

Gaúcho – A Brazilian from the southern states

Greenhouse gases (GHGs) – "gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere and clouds. This property causes the greenhouse effect. Water vapour, carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and Ozone (O_3) are the primary GHGs in the Earth's atmosphere" (IPCC 2012: 960)

***Grileiro/Grilagem* –** Landgrabber/Landgrabbing using false land tittles. *Grilo* means cricket in Portuguese, so the term is supposedly a reference to a practice of forged titles being made to look old by placing them for a few days in a box filled with crickets

Grupal – Vegetable oil producer with an industrial unit in the city of Sorriso

Indirect land-use change (iLUC) – "refers to market-mediated or policy-driven shifts in land-use that cannot be directly attributed to land-use management decisions of individuals or groups" (IPCC, 2012: 961)

Itamaraty (*MRE - Ministério das Relações Exteriores*) – The Ministry of External Relations

***Latifundio/Latifundiário* –** Big landed estate/big land owner

Legal Amazon – Created in 1953, it defined which areas of the country were entitled to participate in the Amazon Economic Valorisation Plan. Apart from the more obvious Amazonian states (e.g. Acre, Amazonas), it also incorporated the state of Maranhão (west of meridian 44), current state of Tocantins and the state of Mato Grosso

Lifecycle analysis (LCA) – Analysis of the full range of environmental damages of any given product, technology, or service. It typically comprises raw material input, energy requirements, and waste and emissions production.

Mitigation – In the international climate change regime, mitigation refers to measures with the objective of reducing the emission of GHG, so as to avoid 'dangerous' climate change

Pacotes – In Mato Grosso, it refers to the technological packages (fertilisers, pesticides, etc) offered to farmers by agro-industry companies in exchange of an amount of soybeans

***Para inglês ver* –** Literally 'for the Englishman to see', this is a widely used expression in the Portuguese-speaking world which means that something is merely for the sake of appearance (just on paper)

Petrobras – The Brazilian state-owned oil company

***Posseiro* –** A land squatter, generally the first kind of occupation as the colonisation front progresses in 'natural', 'unoccupied' regions of Brazil

Pre-salt – Oil reserves located under a salt layer bellow the sea bottom off the coast of Brazil.

***Prefeito*/*prefeitura* –** mayor/town hall

PRODES – A deforestation satellite monitoring system by INPE

***Quilombola* –** A community of descendants of escaped African slaves

Ratoon (or *soca*, in sugar cane plantations) - refers to the sugar cane rooted stalks (lower parts of the plant). They generally undergo cycles of 6 to 7 yearly cuts (cutting the upper part and maintaining the ratoon in the land), after which ratoon is replaced as the yield decreases with each cycle

(in) Reform (sugar cane plantation) - sugar cane in reform (when ratoon has just been replaced) and that won't be collected in the current harvest

Reformed (sugar cane plantation) - refers to the sugar cane reformed in the previous harvest and that is available in the current harvest

***Safrinha* –** In northern Mato Grosso, it is the second harvest after soybean, usually corn

***Seringueiro* –** Rubber tapper

Social Fuel Stamp (*Selo Combustível Social*) – Under the Brazilian PNPB, it is a certificate granted to biodiesel industry provided that a series of social requirements, such as buying feedstock from family farmers, are respected

Soy moratorium - A voluntary agreement by different companies of the soybean producing and processing chain aimed at ensuring in the international market that there is no soybean expansion at the expanse of the Amazon. As an answer from the sector to international criticism, it encompasses the main companies involved in soy production in Mato Grosso (e.g. ADM, Bunge, Cargill, Amaggi, Fiagril) and the Abiove (Brazilian Association of the Industry of Vegetable Oils). It is also supported by different NGOs such as Greenpeace, the NC, and WWF Brazil

Traditional farmer – In Mato Grosso it is usually used to describe the farmers that colonised the region in private colonisation projects, in opposition to official colonisation projects (the *assentamentos*)

Traditional populations – In Brazil it includes indigenous peoples, *quilombolas*, babaçu nut crackers and other populations whose territorial rights were acknowledged by the 1988 Constitution

***Ufanismo* -** A boastful nationalism that highlights the Brazilian potential, its beautiful nature and natural resources

***Usineiro* –** A distillery owner

Appendix C. Acronyms

ABC Programme – The Low Carbon Agriculture Programme

Abiove (*Associação Brasileira das Indústrias de Óleos Vegetais*) – The Brazilian Association of Vegetable Oil Industry

ACP – African, Caribbean and Pacific countries

ALMT (*Assembleia Legislativa de Mato Grosso*) – The Mato Grosso State Parliament

ANP – The National Petrol Agency

APP (Área de Preservação Permanente) – Permanent Preservation Area (Forest Code)

BNDES (*Banco Nacional de Desenvolvimento Econômico e Social*) – The Brazilian Development Bank

BRIC – Brazil, Russia, India and China

CAR (*Cadastro Ambiental Rural*) – Rural Environmental Registry

CEPAL – The United Nations Economic Commission for Latin America

CNA (*Confederação de Agricultura e Pecuária do Brazil*) – The Brazil Agriculture and Livestock Confederation

CDM – Clean Development Mechanism

CONAMA – The National Environment Council

COP – Conference of the Parties (UNFCCC)

CU – Conservation Unit

DAP (*Declaração de Aptidão*) - document conferring 'family farmer' status

DEM (*Democratas*) – Democrats (political party)

Dilma (Dilma Vana Rousseff) – President of the Federative Republic of Brazil since 2011 (PT party)

dLUC – Direct Land-use Change

EMBRAPA (*Empresa Brasileira de Pesquisa Agropecuária*) – The Brazilian Agricultural Research Agency

Famato (*Federação da Agricultora e Pecuária do Estado de Mato Grosso*) – The Mato Grosso Agriculture and Livestock Federation

FAO – The Food and Agriculture Organisation of the United Nations

FC – The Forest Code

Fetagri (*Federação dos Trabalhadores na Agricultura do Estado de Mato Grosso*) – The Mato Grosso Federation of Agriculture Workers

FGV (*Fundação Getúlio Vargas*) – The Getúlio Vargas Foundation

FHC (**Fernando Henrique Cardoso)** - President of the Federative Republic of Brazil from 1995 to 2003 (PSDB party)

Formad (*Fórum Matogrossense de Ambiente e Desenvolvimento*) – The Mato Grosso Environment Forum

GHG(s) – Greenhouse gas(es)

HDI - Human Development Index

Ibama (*Instituto Brasileiro do Meio Ambiente*) – The Brazilian Environment Institute

IBGE (Instituto Brasileiro de Geografia e Estatística) – The Brazilian Institute of Geography and Statistics

ICONE (*Instituto de Estudos do Comércio e Negociações Internacionais*) – Institute for International Trade Negotiations

ICV (*Instituto Centro de Vida*) – A Mato Grosso environmental NGO based in Cuiabá

iLUC – Indirect land-use change

INCRA (*Instituto Nacional de Colonização e Reforma Agrária*) – The National Institute for Colonisation and Agrarian Reform

INPE (*Instituto Nacional de Pesquisas Espaciais*) – The National Institute of Space Research

ISA (*Instituto Socioambiental*) – The Socio-environmental Institute

LAU (*Licensa Ambiental Única*) – Environmental license of agrarian holdings

LR – Legal Reserve (Forest Code)

Lula (Luiz Inácio Lula da Silva) – President of the Federative Republic of Brazil from 2003 to 2011 (PT Party)

LULUCF – Land-use, land-use change and forestry

MAPA (*Ministério da Agricultura, Pecuária e Abastecimento*) – The Ministry of Agriculture, Livestock and Supply

MDA (*Ministério do Desenvolvimento Agrário*) – The Ministry of Agrarian Development

MMA (*Ministério do Meio Ambiente*) – The Ministry of Environment

MME (*Ministério de Minas e Energia*) – The Ministry of Mines and Energy

MST – The Landless People Movement

MT – Mato Grosso

NC – The Nature Conservancy

NCCP – The National Climate Change Policy

NURWU – The Nova Ubiratã Rural Workers Union

PAC (*Programa de Aceleração do Crescimento*) – The Growth Acceleration Programme

PAS (*Programa Amazônia Sustentável*) – The Sustainable Amazon Programme

PCdoB (*Partido Comunista do Brasil*) – The Communist Party of Brazil

PDT (*Partido Democrático Trabalhista*) – The Democratic Labour Party

PNMA – The National Environment Policy

PNPB – The National Programme for the Production of Biodiesel

PPCDAm – The Plan for the Prevention and Control of Deforestation in the Legal Amazon

PPG7 (*Programa Piloto para Proteção das Florestas Tropicais do Brasil*) – The Pilot Program to Conserve the Brazilian Rainforest

Proálcool – The National Alcohol Programme

PMDB (*Partido do Movimento Democrático Brasileiro*) – The Brazilian Democratic Movement Party

PSB (*Partido Socialista Brasileiro*) – The Brazilian Socialist Party

PSD (*Partido Social Democrático*) – The Social Democratic Party

PSDB (*Partido da Social Democracia Brasileira*) – The Brazilian Social democracy Party

PT (*Partido dos Trabalhadores*) – The Workers' Party

PV (*Partido Verde*) – The Green Party

REDE (*Rede Sustentabilidade*) – Sustainability Network

SAE (*Secretaria de Assuntos Estratégicos*) – The Strategic Issues Secretary

Sedraf (*Secretaria de Estado de Desenvolvimento Rural e Agricultura Familiar*) – The Mato Grosso state department of rural development and family farming

SEMA (*Secretaria de Estado do Meio Ambiente*) – The Mato Grosso state department of environment

SEPLAN (*Secretaria de Estado de Planejamento e Coordenação Geral*) – The Mato Grosso state department of planning

SIMLAM (*Sistema Integrado de Monitoramento e Licenciamento Ambiental*) - The licensing and monitoring system of the Mato Grosso SEMA

Sindalcool (*Sindicato das indústrias Sucroalcooleiras do Estado de Mato Grosso*) – The Mato Grosso Union of Sugar-Ethanol Industry

Sindibio (*Sindicato das Indústrias de Biodiesel*) – The Brazilian Union of Biodiesel Industry

SLAPR (*Sistema de Licensiamento Ambiental em Propriedades Rurais*) – The environmental licensing system of rural holdings in Mato Grosso

SNUC (*Sistema Nacional de Unidades de Conservação*) – The National System of Conservation Units

SUDAM (*Superintendência de Valorização Econômica da Amazônia,* currently simply *Superintendência do Desenvolvimento da Amazônia*) – Superintendency for the Economic Valorisation of Amazonia

TNC – Transnational Corporation

Ubrabio (*União Brasileira do Biodiesel e Bioquerosene*) – Brazilian Biodiesel and Bio-jetfuel Union

UFMT (*Universidade Federal de Mato Grosso*) – The Mato Grosso Federal University

UnB (*Universidade Nacional de Brasília*) – The National University of Brasília

UNFCCC – United Nations Framework Convention on Climate Change

UNICA – The Brazilian Sugarcane Industry Association

USP (*Universidade de São Paulo*) – The University of São Paulo

WB – The World Bank

WTO – The World Trade Organisation

ZAE (*Zoneamento Agro-Ecológico*) – The sugar cane Agro-Ecological Zoning Plan

ZEE (*Zoneamento Ecológico-Econômico*) – The Ecological and Economical Zoning Plan

Appendix D. Interview and recorded speech citations

Interview citations

Abiove representative, 2012. Personal interview, São Paulo, December 4

ALMT parliamentarian 1, 2012. Personal interview, Cuiabá, May 14

ALMT parliamentarian 2, 2012. Personal interview, Cuiabá, May 15

ALMT parliamentarian 3, 2012. Personal interview, Cuiabá, May 15

ALMT parliamentarian 4, 2012. Personal interview, Cuiabá, May 15

ALMT parliamentarian 5, 2012. Personal interview, Cuiabá, July 3

Barra do Bugres mayor, 2012. Personal interview, Barra do Bugres, November 13

Barralcool engineer 1, 2012. Forest engineer. Personal interview, Barra do Bugres, November 16

Barralcool engineer 2, 2012. Agrarian engineer. Personal interview, Barra do Bugres, November 16

Barralcool President, 2012. Personal interview, Barra do Bugres, November 14

Big landowner, 2012. Personal interview, Lucas do Rio Verde, November 4

Biodiesel Front parliamentarian, 2012. Member of the Lower House. Personal interview, Brasília, April 25

Caramuru employee, 2012. Personal interview, Nova Ubiratã, July 14

Casa Civil official, 2012. Personal interview, Brasília, May 3

CNA representative, 2012. Personal interview, Brasília, April 24

Consórcio official, 2012. Personal interview, Sorriso, July 11

Coopertã President, 2012. Personal interview, Nova Ubiratã, July 16

Embrapa official 1, 2012. Senior official. Personal interview, Brasília, April 10

Embrapa Agro-Energy official, 2012. Personal interview, Brasília, May 3

Embrapa Sinop official, 2012. Personal interview, Sinop, July 9

EU delegate, 2012. Personal interview, Brasília, May 2

Famato representative, 2012. Personal interview, Cuiabá, July 7

Farmer 1, 2012. Traditional farmer. Personal interview, Nova Ubiratã, July 13

Farmer 2, 2012. Traditional farmer. Personal interview, Nova Ubiratã, July 13

Farmer 3, 2012. Traditional farmer. Personal interview, Nova Ubiratã, July 13

Farmer 4, 2012. Traditional farmer. Personal interview, Nova Ubiratã, July 14

Farmer 5, 2012. Traditional farmer. Personal interview, Nova Ubiratã, July 14

Farmer 6, 2012. *Assentado*. Personal interview, Nova Ubiratã, July 16

Farmer 7, 2012. *Assentado*. Personal interview, Nova Ubiratã, July 16

Farmer 8, 2012. Traditional farmer. Personal interview, Nova Ubiratã, July 16

Farmer 9, 2012. Traditional farmer. Personal interview, Nova Ubiratã, November 7

Farmer 10, 2012. *Assentado*. Personal interview, Nova Ubiratã, November 7

Farmer 11, 2012. Farmer. Personal interview, Barra do Bugres, November 12

Farmer 12, 2012. Farmer. Personal interview, Barra do Bugres, November 12

Farmer 13, 2012. Farmer. Personal interview, Barra do Bugres, November 12

Farmer 14, 2012. Farmer. Personal interview, Barra do Bugres, November 12

Farmer 15, 2012. Farmer. Personal interview, Barra do Bugres, November 13

Farmer 16, 2012. Farmer. Personal interview, Barra do Bugres, November 13

Farmer 17, 2012. Farmer. Personal interview, Barra do Bugres, November 14

Farmer 18, 2012. Farmer. Personal interview, Barra do Bugres, November 14

FGV scholar, 2012. Personal interview, São Paulo, December 3

Formad member 1, 2012. Personal interview, Cuiabá, May 8

Formad member 2, 2012. Personal interview, Cuiabá, May 18

Formad member 3, 2012. Personal interview, Cuiabá, October 31

Greenpeace member, 2013. Personal interview, São Paulo, May 10

Ibama Sinop official, 2012. Personal interview, Sinop, July 18

ICV member, 2012. Personal interview, Cuiabá, October 31

ISA member, 2013. Personal interview, Brasília, April 13

Itamaraty official, 2012. Personal interview, Brasília, April 11

José Goldemberg, 2012. Former Environment Secretary and USP scholar. Personal interview, São Paulo, October 30

MAPA official, 2012. Personal interview, Brasília, April 25

MDA official, 2013. Personal interview, Brasília, April 8

MMA official 1, 2012. Personal interview, Brasília, April 11

MMA official 2, 2013. Personal interview, Brasília, April 12

MMA climate change secretary, 2012. Personal interview, Rio de Janeiro, June 21

MME official, 2012. Personal interview, Brasília, April 12

NC member, 2012. Personal interview held while driving from Sorriso to Nova Ubiratã, November 6

Nova Ubiratã Environment Secretary, 2012. Personal interview, Nova Ubiratã, November 8

Nova Ubiratã former mayor, 2012. Personal interview, Nova Ubiratã, July 16

Nova Ubiratã mayor, 2012. Personal interview, Nova Ubiratã, July 16

NURWU President, 2012. Personal interview, Nova Ubiratã, July 16

PT parliamentarian, 2012. Member of the Lower House. Personal interview, Brasília, April 10

Rural Producers Union President, 2012. Personal interview, Nova Ubiratã, November 7

Sedraf secretary, 2012. Sub-Secretary for Regional Development. Personal interview, Cuiabá, May 8

SEMA secretary, 2012. Personal interview, Cuiabá, May 10

SEMA official 1, 2012. Personal interview, Cuiabá, May 15

SEMA official 2, 2012. Personal interview, Cuiabá, November 21

SEMA Tangará da Serra official, 2012. Personal interview, Tangará da Serra, November 14

SEPLAN official, 2012. Personal interview, Cuiabá, November 1

Sindalcool representative, 2012. Personal interview, Cuiabá, November 21

Sindibio representative, 2012. Personal interview, Barra do Bugres, November 13

Ubrabio representative, 2012. Personal interview, Salvador, April 18

UnB scholar, 2013. Personal interview, Brasília, April 13

Recorded speech citations

Homero Pereira, Congressman. Speech at the PSD convention, Sorriso, 11 May 2012

Blairo Maggi, Senator. Speech at the opening of Embrapa Sinop, 6 July 2012

Izabella Teixeira, Minister of the Environment. Speech at the Rio+20, 21 June 2012

Marina Silva, former Minister of the Environment. Speech at José Eli da Veiga's book launch, São Paulo, 16 May 2013

Nova Ubiratã former mayor. Speech at a public hearing on environmental regularisation, Nova Ubiratã, 6 November 2012

Nilson Leitão, Congressman. Speech at the opening of Embrapa Sinop, 6 July 2012

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